ONE DOLLAR PER COPY

the OIL AND GAS JOURNAL

PUBLISHED WEEKLY

Aug. 31 1959

E. B. Miller and Jake Hamon . . . two men largely responsible for

What the Conservation Forum Has Accomplished

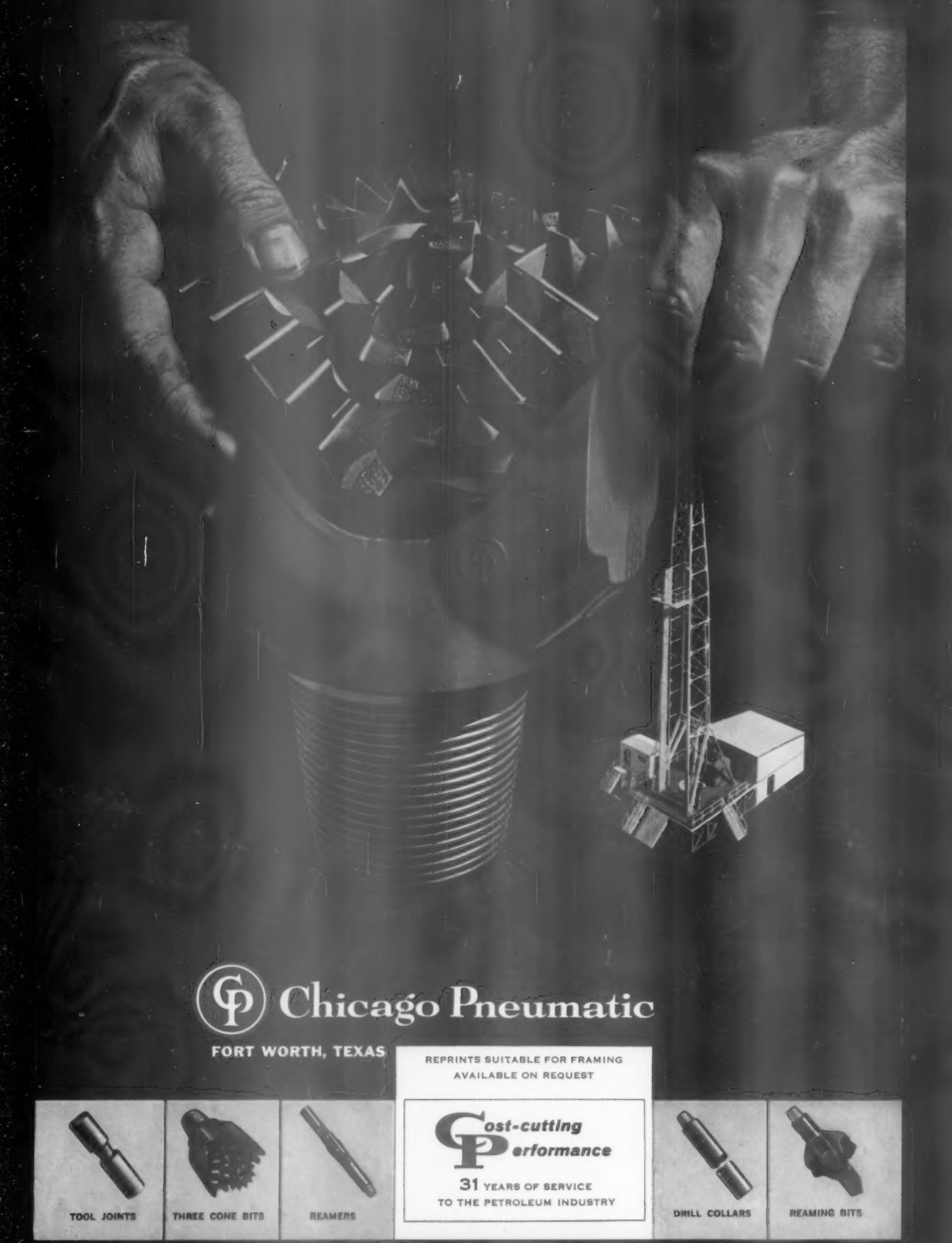
p. 36

What gas has done to the Northwest ▸ 27

World's biggest water flood nears ▸ 55

Getting top performance from turbine meters ▸ 61

Stripping tubing from an 8,100-psi. well ▸ 64



Chicago Pneumatic

FORT WORTH, TEXAS

REPRINTS SUITABLE FOR FRAMING
AVAILABLE ON REQUEST

Cost-cutting Performance

31 YEARS OF SERVICE
TO THE PETROLEUM INDUSTRY

TOOL JOINTS

THREE CONE BITS

REAMERS

DRILL COLLARS

REAMING BITS

OIL AND GAS JOURNAL
Vol. 57 No. 36

Contents August 31, 1959

THE WEEK'S NEWS

General Interest:
Titusville's Week-Long Party Climaxes Oil Centennial ... 25
July Imports Drop, Reflect Rise-Fall Pattern ... 31
Socony's Computer Network Speeds Answers ... 34
Oil to Keep Top Billing in Energy-Supply Picture ... 41
Photos in the NEWS ... 44

Drilling-Production:
Texas Court Attack Launched on Small-Tract Drilling ... 28
Conservation Forum's Spacing Campaign Shows Results ... 36

Processing:
Esso Refining Workers to Vote on Union Representation ... 30
Amoco Threatens to Hire Nonunion Workers at Texas City ... 30
Canadian Oil Will Build New Refinery in Alberta ... 31
Esso Develops Fast Way to Detect Water in Jet Fuel ... 33
Conoco Plans Straight-Chain Alcohol Plant at Lake Charles ... 41
Celanese Expands Pampa Acetic-Acid Installation ... 43
Processing Briefs ... 43

Foreign News:
Foreign Drilling Activity Shows Slight Drop ... 46
Fire Destroys Russian Offshore Rig and Platform ... 47
Pemex Expansion Program Begins to Show Results ... 48
Iraqi Wildcat, Aiming for Deep Pay, Hits in Upper Zone ... 48
Pipeline Finished From Sahara's Hassi Messaoud Field ... 49
British Firm Buying Company With Panama Refinery Plan ... 49

Pipelining:
Natural Gas Cuts Into Pacific Northwest Fuel Market ... 27
Richfield Files Appeal in Public-Utility Ruling ... 32
Pipeline Briefs ... 34

Exploration:
Eskimos May Be Used to Drill Test in Arctic Circle ... 33
Gulf's Offshore Florida Wildcat Is Dry Hole ... 41
Appalachian Deep Drilling Gives Cause for Optimism ... 109
Southwest Enville—A Development Headache ... 110
Australasian Oil Prospects Need More Drilling ... 114
July Well Completions ... 129

EVERY WEEK

Advertisers' Index .. 143
Book Review ... 82
Calendar of Events .. 17
Classified Advertising 139
Deaths ... 133
Drilling Contractors 107
Drilling Statistics ... 135
Editorial ... 23
Equipment Men 103
Exploration Highlights 109
Foreign News 46
Foreman's Page 70
Journally Speaking .. 19
Markets 138
New Equipment 98
Personals 130
Pipeline Construction . 89
Process Costimating .. 87
Production 136
Refining Statistics ... 137
Statistical Summary .. 134
They Say 10
Trade Literature 102
Watching Washington 29

Technology-Operation section on next page →

The Oil and Gas Journal is published weekly with an additional issue in January by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1959 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

TECHNOLOGY—OPERATION

Production

California's Wilmington Field Will Be World's Biggest Water Flood 55

By D. H. Stormont

By mid-1960 more than 1 million barrels per day of water will be injected through 230 wells. Current injection rate is 215,000 bbl. of ocean brine daily. The huge operation will involve an expense of about $65,000,000 but should increase oil recovery by some 400 million barrels and alleviate subsidence problem.

Pipelining

Get Top Performance From Turbine Meters 61

By A. J. Granberg

These new meters have drawbacks, but under proper conditions, will do a job unequaled by other methods. Velocity, viscosity, and temperature conditions must be carefully analyzed. The meter is low in pressure drop and low in maintenance costs.

Pipelining Construction Report 89

Drilling

How Sinclair Stripped Tubing From 8,100-psi. Well 64

By Ed McGhee

The well was under control at all times and there was little unforeseen difficulty as the 13,000-ft. string of 1¼-in. tubing was stripped from a South Louisiana well. Cementing trucks displaced an equal amount of 21.5-lb. mud into the wellhead as tubing was stripped from the well.

Here's a Big Rig for Deep Drilling 68

Sharp Drilling Co.'s new Rig 43 is specifically designed for 20,000-ft. plus wells. It has an extra-high substructure, a three-speed transmission on the pump drive, and high pump power.

Refining-Processing

The Foreman's Page 70

How to maintain and operate industrial furnaces.

Steam Power Cycle Utilizes Gas Turbine at Carbide 77

By Joseph E. Parker

Primary application for the turbine is as driver for centrifugal air compressor. The exhaust steam from the turbine, actually highly heated air, is then fired under a boiler with enough fuel to utilize the available oxygen in the exhaust. Over-all efficiency for the combined gas-turbine-boiler unit is about 77%.

Atlantic's New $10,000,000 Wax Plant 83

By J. R. Ghublikian, J. B. Clapham, W. T. Dixon, and D. E. Wigfield

The 250-ton per day unit, one of the largest in the world, is engineered to produce close-cut, low-oil-content paraffin waxes of highest quality. Texaco solvent-dewaxing unit assures waxes having good hardness characteristics and high blocking temperatures.

Process Costimating—55 87

Turnaround labor and stream efficiency.

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
August 31, 1959

Rotary drilling abroad has slipped:

Journal survey shows 833 rigs now making hole in Free World outside U. S. and Canada. That's drop of 13 since April (p. 46).

Big reason: Depressed activity in Venezuela.

Companies in Venezuela have cut down drilling budgets since income tax went into effect. Only 61 rigs are active now compared with 123 in fall of 1957.

Venezuelan slump may hang on too. Only 11 exploration parties are now active in the country and only five survey parties probably will be there this fall.

Regional hot spots revealed in survey: Argentina and Colombia in South America; Libya, Algeria, Nigeria and French Equatorial in Africa; and Iran in the Middle East.

Active rotary rigs in U. S. and Canada, meanwhile, were 2,303 last week, two more than week before.

High point for year so far was 2,456 in June.

▼ ▼ ▼

U. S. oil firms last year slowed down sharply their investments abroad.

Department of Commerce reports investments reached $9.7 billion last year compared with $9 billion in 1957. The 0.7 billion growth was off more than half from the $1.7 billion invested the year before.

Most of the decline occurred in Venezuela. But sharp drop also was noted in Canada.

▼ ▼ ▼

Court attack has been launched on drilling pint-sized tracts in Texas gas fields.

The suits will test authority of Texas Railroad Commission to reject a secondary-recovery application and permit small-tract drilling.

Involved is a proposed unitized cycling program for Port Acres field (p. 28).

The Oil Industry Conservation Forum is nearly a year old.

Its accomplishments: A new Oklahoma law authorizing 80-acre spacing for deep wells and conservation gains in Texas, Arizona, Nebraska, and Kansas.

Prospect is bright for greater strides to cut production costs in the industry within next 2 years (p. 36).

▼ ▼ ▼

Big boost to Alberta's Dick Lake field comes from new gas strike of British American in south half of field.

New BA-CPR Atlas 7-15 well had gross D3 pay section of 451 ft. The 7,645-ft. well achieved open-flow potential of 1.2 billion cubic feet of gas daily during tests. This is five times open-flow potential of five earlier wells.

The well—a joint venture of British American, California Standard, Phillips, and Husky—is about 55 miles south of Edmonton. Gas in the field is partly under contract to Trans-Canada Pipe Lines and Alberta and Southern Gas.

Pauley has a dual producer at his stepout to discovery well for Santa Ana field in Gulf of Campeche.

Stepout tested 2,340 bbl. daily from zones at 5,720 ft. and 8,031 ft. Discovery well tested 1,596 bbl. daily—also from two zones.

Pauley is stepping up his drilling program both offshore and in North Mexico where he also has a development deal with Pemex. His stepped-up activity is part of a broad expansion now going on in the Mexican petroleum industry (p. 48).

Exploration notes:

...Cuban Kewanee plans to drill five or six wildcats in Pinar del Rio province west of Havana on acreage acquired in farmout from Atlantic.

...Florida offshore wildcat has been abandoned by Gulf. The expensive 15,475-ft. test was near the Marquesas Keys west of Key West. Other drilling is in the mill.

...First oil has been found in southern England at BP test in Dorset.

...Eskimos may get first chance to work as drilling rig crew members in an Arctic Circle wildcat being planned by Scurry-Rainbow in Grandview Hills area 150 miles northwest of Norman Wells field.

...Iraq wildcat tests at rate of 2,000 bbl. daily from upper zone but drill is going deeper. Location is 25 miles west of big Kirkuk producing trend.

▼ ▼ ▼

Imports were down sharply in July.

Average was 1,134,345 bbl. daily compared to 1,633,473 bbl. daily in June.

Explanation: July was first month of 6-month allocation

period and June the last of previous period. Importers strain to fill all their quotas in last month of period because they are not allowed a carryover. Imports are slow in first of period because of delays in arranging shipping schedules.

Two changes in import regulations:

...U. S. refiners no longer will be permitted to include crude or unfinished oil imported overland from Canada in computing their refinery input.

...Puerto Rico is granted increases of 2,098 bbl. daily of jet fuel imports and 269 bbl. daily of asphalt imports.

Expanded coverage of world petroleum statistics is being undertaken by the Bureau of Mines.

In addition to previous reporting, the bureau is now adding country data on total input and output at refineries, movements of refined products, and domestic demand for products. Starting date for the data is January, 1959.

▼ ▼ ▼

New field of petrochemicals is being entered by Conoco with new petrochemical plant at Lake Charles, La.

Plant will make straight-chain alcohols from a petroleum base for the first time. Conoco will market the new series of alcohols for use in making detergents, plasticizers, cosmetics, lube oil additives, paper, textiles.

A British holding company, Ultramar, Ltd., is taking over a proposed $50-million refinery project in Panama.

Ultramar has completed arrangements to acquire Panama Refining & Petrochemical Co. of Los Angeles. Cash and exchange of stock were involved.

▼ ▼ ▼

Reports of new crude pipeline by Hess Transport & Trading designed to tap crude in three Southwest Texas Counties were confirmed in Houston last week.

Company reportedly seeks to move 4,000 bbl. daily of crude from Dimmit, Maverick, and Zavala counties to Corpus Christi for tanker shipment to the East Coast where it has a new refinery.

One report says Hess plans an 8-in., 125-mile line to tie in with Magnolia pipeline at Tilden.

At present part of the production is trucked to the 2,000-bbl. daily refinery of Texas Calgary at Carrizo Springs in Dimmit County.

Richfield has launched an all-out fight against a California Public Utilities Commission ruling that the oil company is a gas public utility (p. 32).

Richfield has asked for a rehearing. Case ultimately may reach the state supreme court.

Natural gas has elbowed its way into position as a full-fledged fuel in the Pacific Northwest within the span of 3 years (p. 27).

Gas progress so far has been in industrial areas at the expense of fuel oil. Now gas utilities are turning to residential users and are setting aim on markets now served by the distillates.

Comparative costs of home-heating fuels have been compiled by Northern Illinois Gas and Peoples Gas.

For a typical, upstate home with 1,089 sq. ft. of floor space, costs during the 1958-59 heating season were: Natural gas $120, coal stoker fired $124, coal hand fired $173, No. 2 fuel oil $196, propane $257, electric heat pump $265, and electric-resistance heating $524.

Peoples Gas study gives this ranking for normal annual heating costs for single-family Chicago dwelling: Stoker-fired coal $163; gas $177; No. 2 fuel oil $214; electric heat pump $334; and electric-resistance heating $669.

▼ ▼ ▼

Technological changes in next 100 years may revolutionize the oil industry, says Pan American President A. L. Solliday.

Among the possibilities:

...Strata-vision processes will show where oil and gas exist and in what quantities.

...Jet flames or sonic waves will drill to the oil by burning holes in the earth. The derrick, draw works, and pipe may be eliminated.

...Producing many oil fields automatically will be handled by one man at a central computer system.

But in the meantime, the industry still must solve such mundane problems as foreign competition, taxes, and federal controls.

▼ ▼ ▼

Need an idea for a program or an educational and public relations activity?

Davison Chemical may solve your problem. It has for loan a miniature operating cat cracker. It shows all phases of cracking, including the regeneration cycle. Air currents provide realistic flow of catalyst through the unit. Set up, the cracker is 50-in. long, 40-in. wide, and 60-in. high.

The unit is simple to assemble—takes 30 minutes. It is easy to operate—just plug in. Davison offers it to the industry for use by the industry. Just say where and when you want it.

MUD MONARCH

SILVER TOP

ONE OF THESE

SUPER-SERVICE

valves and seats will cut your costs, too.

Each type of valve and seat is designed to be the best for its service. And even more, each Mission Valve and Seat is *built* to be the best. Advanced metallurgy, precision machine tools, and rigid quality control combine to cut replacement costs, to increase the efficiency of pump operation.

Mission MUD MONARCH® Valves and Seats *for extremely high and medium pump pressures.* Unique design with exclusive seal ring results in exceptional performance as this ring seals effectively when body and seats are severely worn. Compound 308® and Compound 711 inserts are available.

Mission SUPER-SERVICE® Valves and Seats *for medium pump pressures.* Four crossarms provide extra strength and large striking surface, assuring long valve seat life without restricting flow area.

Mission SILVER TOP® Valves and Seats *for low and medium pump pressures.* Replaceable, wear-taking bushing greatly reduces valve seat replacement costs. The famous Compound 308® inserts are interchangeable with Mission SUPER-SERVICE Valves.

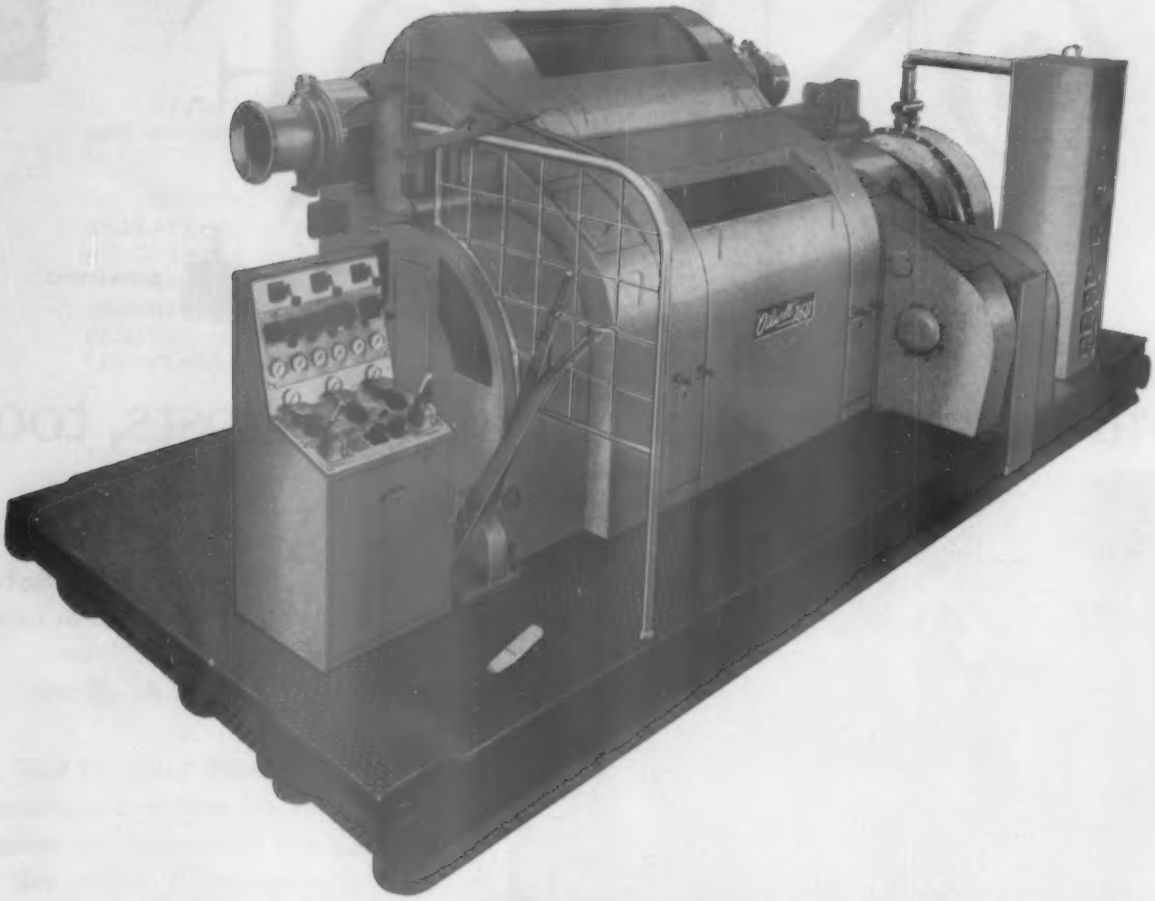
Mission Valves and Seats are available for all popular makes of reciprocating pumps. Buy them anywhere through your supply store.

For over thirty years—quality built in to last

MISSION MANUFACTURING CO., P. O. BOX 4209, HOUSTON, TEXAS • CABLE ADDRESS—"MISSCO"
EXPORT OFFICE: 30 ROCKEFELLER PLAZA, NEW YORK • IN THE UNITED KINGDOM: MISSION MANUFACTURING CO., LTD., 17 HANOVER SQUARE, LONDON W. 1 ENGLAND • CABLE ADDRESS—"MISSOMAN"
PISTONS • PISTON RODS • SLIPS • GLAND PACKINGS • LINERS • LINER PACKING
PUMP VALVES AND SEATS • SWABS • VALVES • HAMMERDRILS • CENTRIFUGAL PUMPS

MISSION MANUFACTURING CO.

59-102



Here's the latest Draw Works for medium-depth drilling

the OUTSTANDING "Oilwell" 760

"Oilwell's" 760 Draw Works represents another outstanding engineering achievement in the field of heavy-duty drilling equipment.

In addition to the emphasis on strength with mobility, the 760 is designed to cut maintenance costs and down time. The housing has oil-tight, quick-opening inspection doors at just the right places for easy access to every maintenance point.

Shaft assemblies are designed for speedy removal when necessary. Spacious openings to the transmission area with staggered mounting of input and output transmission shafts makes everything easy to reach when chains need servicing.

Identical Fawick Airflex ventilated constricting-type clutches are used on both high and low drums, and the high drum clutch is gap-mounted for easy removal without disturbing the auxiliary brake.

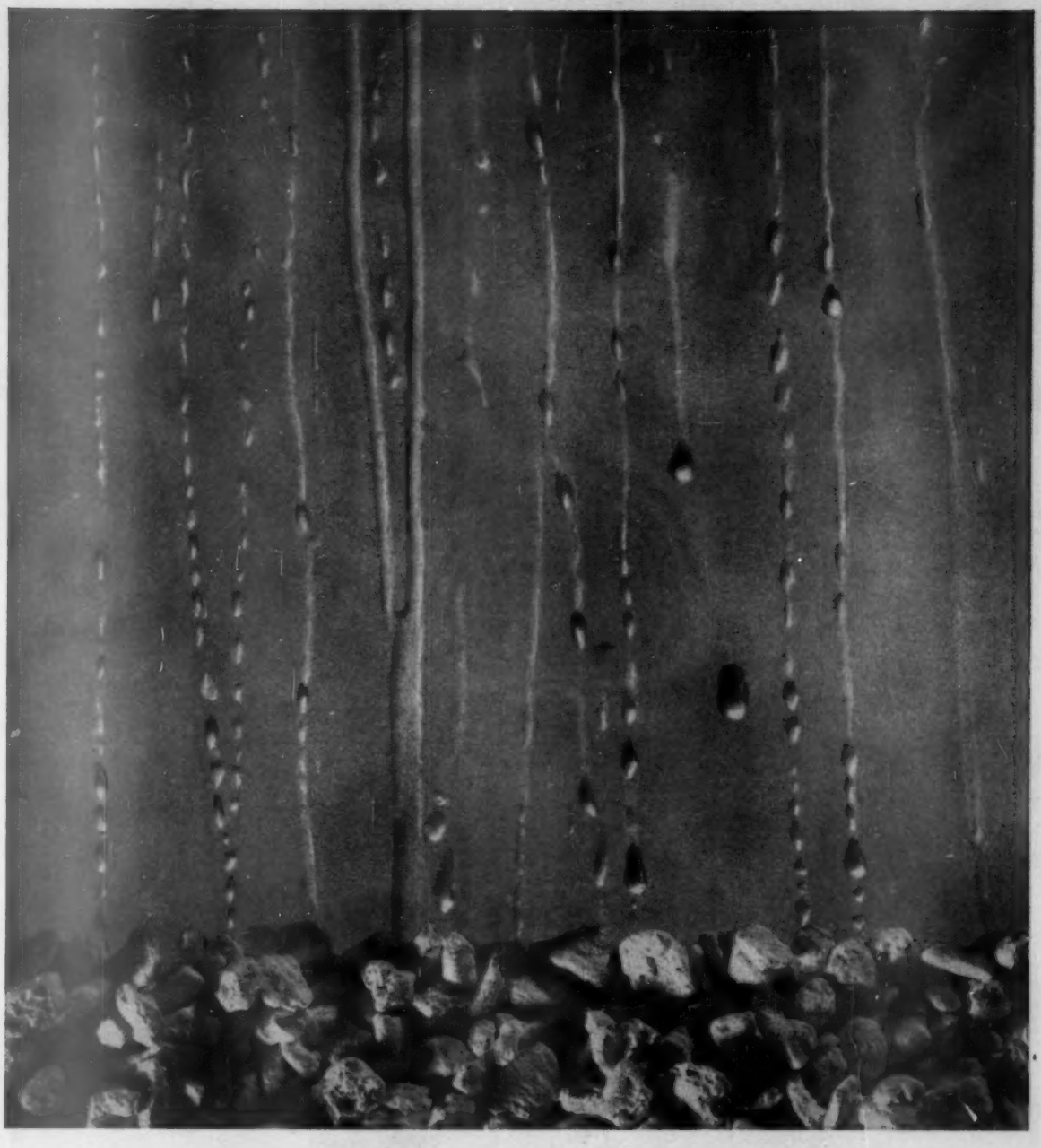
The control console of this new draw works provides the ultimate in convenience for the driller. It gives full air control of all clutching, shifting, and throttling and has *push buttons* to compound engine throttles in any combination for pumping or hoisting. Since the console is a separate unit, it can be serviced easily from either front or back.

If you're looking for economical operation throughout the 7,000-12,000-ft. range in ONE rig, you will get it with the 760. Your nearest "Oilwell" or Wilson Supply Company representative has the story, or, we'll be glad to send an illustrated brochure on this new addition to the "Oilwell" line.

USS and "Oilwell" are registered trademarks

Oil Well Supply Division of USS United States Steel

Executive Offices—Dallas, Texas • Export Office—30 Rockefeller Plaza, New York 20, N. Y.



Unwanted water may ruin your product or process unless you

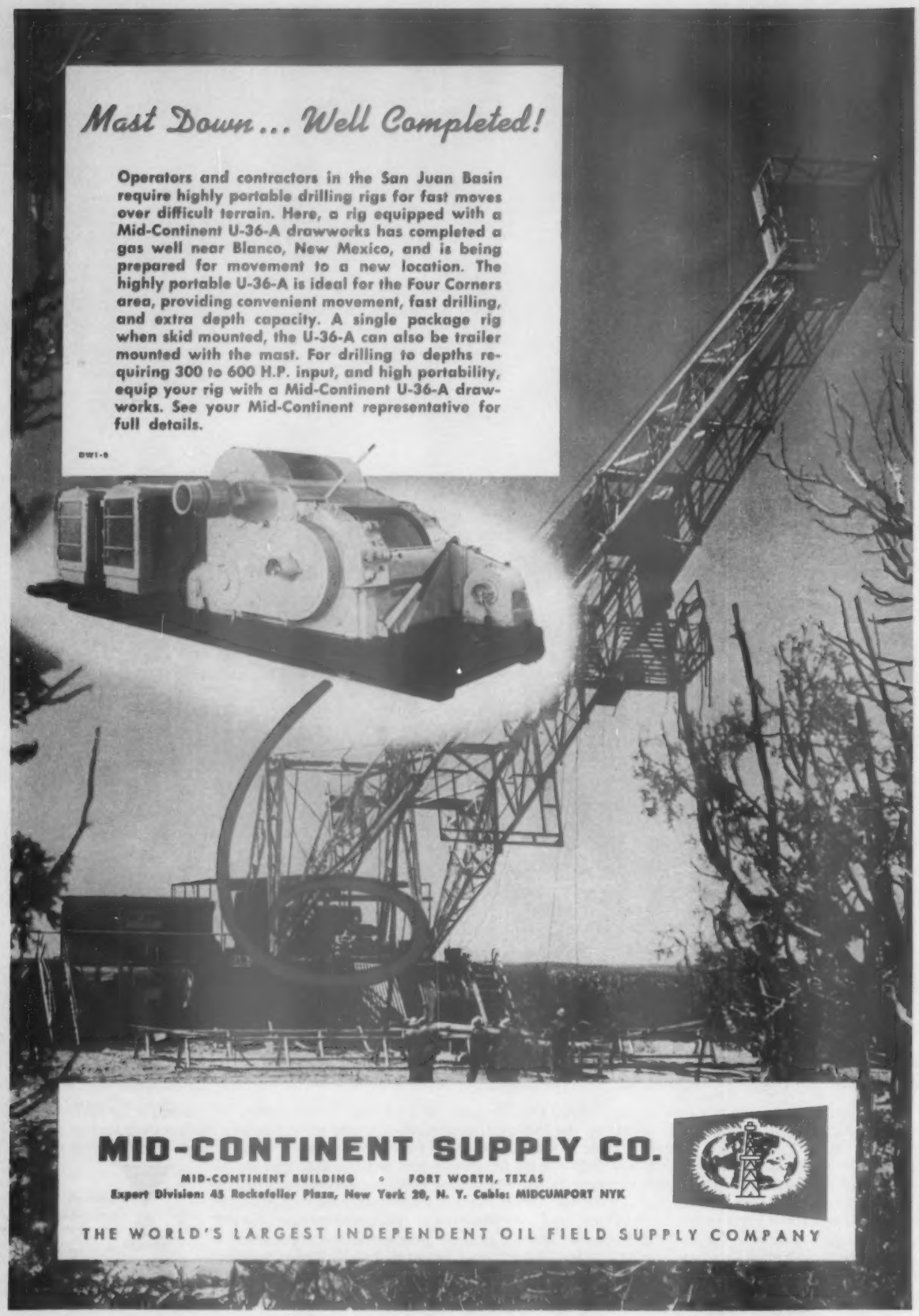
mix imagination with Alcoa Activated Aluminas

Water you can't remove is a sure bet to destroy the efficiency of a process or the quality of a product, or corrode the equipment. But you can count on drying up the last drop of unwanted water when you mix imagination and engineering with ALCOA® Activated Alumina. Here is the oldest, most thoroughly proved drying agent available. It makes possible dew points to minus 100°F and below. And because it can be saturated and reactivated almost endlessly without loss of capacity, it cuts drying costs substantially. See how quickly it can solve *your* dehydration problems. You'll join the thousands who've discovered it pays to *mix imagination with Alcoa Aluminas . . . to make a new product or process possible, an old product or process better.* To get product details, outline your desiccant application in a letter to ALUMINUM COMPANY OF AMERICA, CHEMICALS DIVISION, 709-H Alcoa Building, Pittsburgh 19, Pennsylvania.

ALCOA CHEMICALS

For exciting drama, watch "Alcoa Theatre," alternate Mondays, NBC-TV, and "Alcoa Presents," every Tuesday, ABC-TV

For finer products . . . let Alcoa add new dimension to your creative thinking


Mast Down... Well Completed!
Operators and contractors in the San Juan Basin require highly portable drilling rigs for fast moves over difficult terrain. Here, a rig equipped with a Mid-Continent U-36-A drawworks has completed a gas well near Blanco, New Mexico, and is being prepared for movement to a new location. The highly portable U-36-A is ideal for the Four Corners area, providing convenient movement, fast drilling, and extra depth capacity. A single package rig when skid mounted, the U-36-A can also be trailer mounted with the mast. For drilling to depths requiring 300 to 600 H.P. input, and high portability, equip your rig with a Mid-Continent U-36-A drawworks. See your Mid-Continent representative for full details.
DW1-6
MID-CONTINENT SUPPLY CO.
MID-CONTINENT BUILDING • FORT WORTH, TEXAS
Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK
THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY

Completes 46 Structures in 4 Months

at Petroleum Chemicals, Inc.

CB&I's *coordinated services* played a major role in construction of three new petrochemical plants recently placed on-stream by Petroleum Chemicals, Inc., at Lake Charles, Louisiana.

CB&I's assignment: Fabricate and erect 13 processing towers and 33 storage tanks for an expansion program that would—and did—put three plants in operation during a four-month period.

The new plants—ammonia, ethylene and ethylene oxide-glycol—have catapulted Petroleum Chemicals into a major petrochemicals producer, less than four years after its founding.

Companies on the move, such as Petroleum Chemicals, know they can depend on CB&I's *coordinated services* to meet exacting specifications and schedules. The reason: Expert, *one source* responsibility for engineering, fabrication and erection.

These are the benefits of CB&I's seven decades of *craftsmanship in steel*. Write our nearest office for the bulletin: *Development of the Oil Storage Tank*.

Propane is stored in these vertical blimps built by CB&I for Petroleum Chemicals. Each structure is 60 feet high, 12½ feet in diameter and has a 1,500-barrel storage capacity.

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in Birmingham • Chicago • Houston • Salt Lake City • Greenville, Pa.
Torrance, Calif. • New Castle, Delaware

SUBSIDIARIES:
Horton Steel Works Limited, Toronto; Chicago Bridge & Iron Company Ltd., Caracas;
Chicago Bridge Limited, London; Chicago Bridge Construcoes Ltda., Rio de Janeiro

REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland

P-83CB

PROFIT NEWS FOR POWER USERS IN THE

all purpose power line

(20 TO 1650 H.P. IN ONLY 3 CYLINDER SIZES)

Now you can enjoy the benefits of GM Diesel standardization in every type of oil field equipment—and still buy the best makes of equipment on the market.

GM Diesel engines are offered in more than 1800 applications of power equipment by over 250 leading manufacturers—wider availability than any other Diesel.

Only by standardizing on GM Diesel will a user get *all* the benefits of engine standardization—for *only* GM Diesel covers the entire power range with only 3 cylinder sizes.

Widest parts interchangeability pays off in lower parts inventory requirements—for example, many parts for a 33 H.P. "Jimmy" Diesel fit a 1650 H.P. "Jimmy."

GM DIESEL

PARTS AND SERVICE WORLDWIDE

In Canada: GENERAL MOTORS DIESEL LIMITED, London, Ontario

DETROIT DIESEL ENGINE DIVISION, GENERAL MOTORS, DETROIT 28, MICH.

Introducing—

D-500 Fire Hose

—for a surer kind of protection under fire

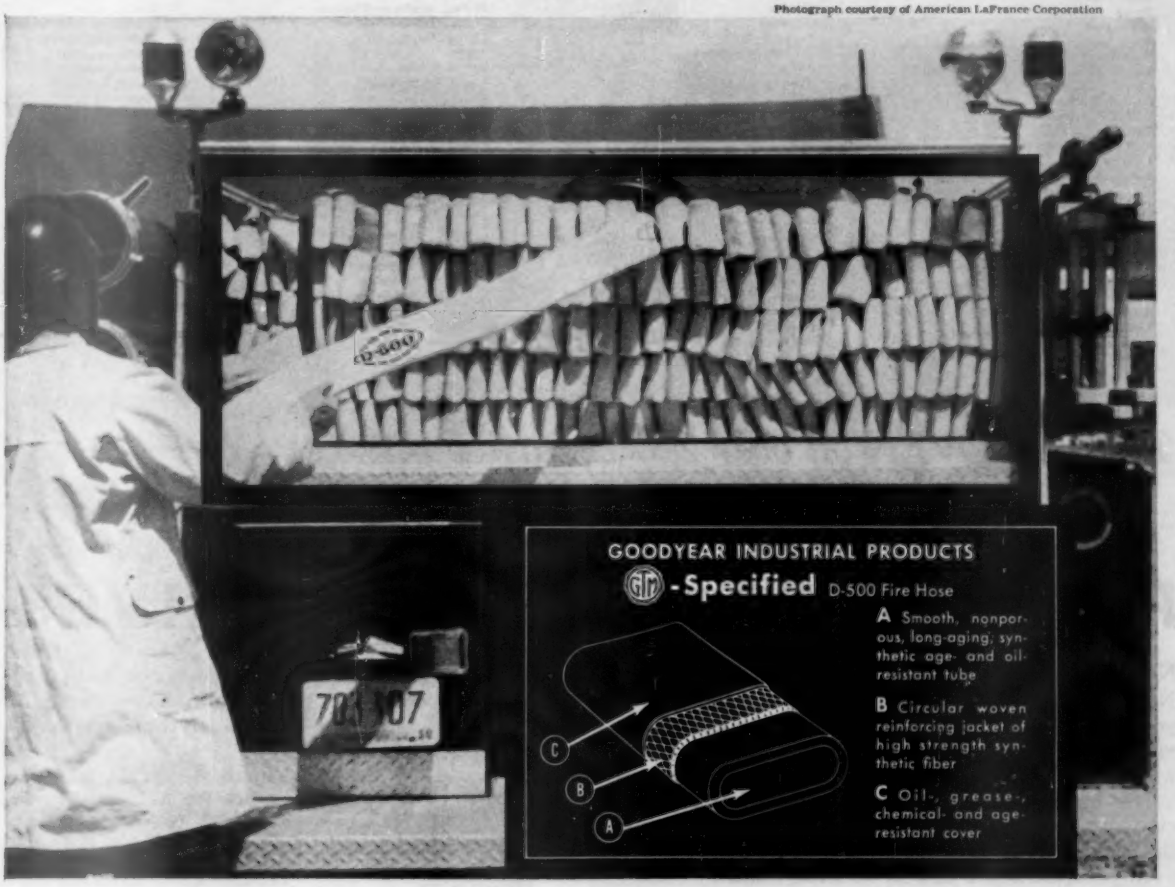
Here's hose with all the dependable durability a 500-lb. factory test assures-plus lighter-weight construction that makes for easy handling. It's highly flexible and *stays* that way. And it's mildewproof.

Petro-chemical users will cash in on its unsurpassed oil- and chemical-resistance — inside and out. In fact, that's important to any user of the newest fire-fighting chemicals. And D-500 Fire Hose is available with white, black, yellow or red cover for ready visibility as well as for those who require color-coded fire-fighting lines.

What's more D-500 Fire Hose is guaranteed throughout its long life against defects in workmanship and materials. For the full story of this newest advance in fire-fighting equipment, contact the G.T.M. through your Goodyear Distributor—or by writing Goodyear, Industrial Products Division, Akron 16, Ohio.

IT'S SMART TO DO BUSINESS *with your Goodyear Distributor. He can give you fast, dependable service on Hose, V-Belts, Flat Belts and many other industrial rubber and nonrubber supplies. Look for him in the Yellow Pages under "Rubber Goods" or "Rubber Products."*

Photograph courtesy of American LaFrance Corporation


D-500
GOODYEAR INDUSTRIAL PRODUCTS
GTM -Specified D-500 Fire Hose
A Smooth, nonporous, long-aging, synthetic age- and oil-resistant tube
B Circular woven reinforcing jacket of high strength synthetic fiber
C Oil-, grease-, chemical- and age-resistant cover
C
B
A

INDUSTRIAL FIRE HOSE BY

GOODYEAR

THE GREATEST NAME IN RUBBER

Alcohol—Amyl
Alcohol—Butyl
Alcohol—Ethyl
Alcohol—Methyl
Alcohol—Propyl
Allyl Alcohol (96%)
Allyl Chloride
Alum
Alum, Ammonium
Alum,
Alu
Al
A
Ammonium Persulfate
Ammonium Phosphate
Ammonium Sulfate (Saturated)
Ammonium Sulfide
Ammonium Thiocyanate
Amyl Acetate
Aniline Hydrochloride (10%)
Beer
Beet Sugar Liquors
Benzene
Benzoic Acid
Benzol
Benzyl Acetate
Benzyl Alcohol
Black Liquor
Borax
Boric Acid
Brine (acid)
Butadiene
Butyric Acid
Calcium Carbonate
Calcium Chlorate
Calcium Chloride
Calcium Hydroxide
Calcium Hypochlorite
Calcium Nitrate
Calcium Oxide
Calcium Sulfate
Caprylic Acid
Carbon Bisulfide
Carbon Dioxide (dry)
Carbon Dioxide (wet)
Carbon Disulfide
Carbon Monoxide
Carbon Tetrachloride
Carbon Acid
Castor Oil
Caustic Potash (30%)
Caustic Soda (30%)

Chloroacetic Acid
Chlorox Bleach Solutions
(5.5 avail. Cl_2)
Chromic Acid—up to 40%
Citric Acid
Coconut Oil
Copper Carbonate
Copper Chloride
Copper Cyanide
Copper Fluoride
Nitrate
Sulfate
Oil
Oil
Hexane
Salts
Phthalate
Fuels
Ether
Acid
Salt
Alcohol
Chloride
Glycol
Acids
Chloride
Nitrate
Sulfate
Ferrous Chloride
Ferrous Nitrate
Ferrous Sulfate
Formaldehyde (32%)
Formic Acid
Freon F22 (gas)
Freon F22 (Liquid)
Fructose
Fruit Juices, Pulp
Gas—Manufactured
Gas—Natural
Gasoline
Gin
Glucose
Glycerine
Hexanol—Tertiary
Hydrobromic Acid
Hydrochloric Acid
Hydrocyanic Acid
Hydrofluoric Acid
Hydrogen Peroxide
Hydrogen Sulfide
Hydrogen Sulfide
Sodium Hydrosulfide
Hydrosulfite
Hypochlorite
75% Hypochlorite
Lactic Acid
Lard
Lead Acetate
Lemon Juice
Linoleic Acid
Linseed Oil
Linseed Oil (Refined)
Liqueurs
Lubricating Oil
Magnesium Hydroxide

Magnesium Sulfate
Maleic Acid
Malic Acid
Mercurous Nitrate
Mercury
Methyl Alcohol
Methyl Bromide
Methyl Salicylate
Milk
Mineral Oil
Molasses
Monoethanolamine
Naphtha
Nicotinic Acid
Nitric Acid (10%)
Nitrous Acid (10%)
Nitrous Oxide
Oil and Fats
Oleic Acid
Orange Juice
Oxygen
Palmitic Acid up to 70%
Perchloric Acid (10%)
Petrolatum
Petroleum Oil (crude)
Petroleum Sour Crude
Petroleum White Oil
Phenylhydrazine Hydrochloride
Phosgene (gas)
Phosgene (liquid)
Phosphoric Acid (10%)
Phosphorus—Pentachloride
Phosphorus—Pentoxide
Phosphorus—Red
Phosphorus—Yellow
Photographic Solutions (all)
Plating Solutions—Brass
Plating Solutions—Cadmium
Plating Solutions—Chromium
Plating Solutions—Copper
Plating Solutions—Gold
Plating Solutions—Lead
Plating Solutions—Nickel
Plating Solutions—Rhodium
Plating Solutions—Silver
Plating Solutions—Tin
Plating Solutions—Zinc
Potassium Aluminum Sulfate
Potassium Bicarbonate
Dichromate
Borate
Bromate
Carbonate
Chlorate (aqueous)
Chloride
Chromate
Cyanide
Dichromate (sat.)
Ferricyanide
Ferrocyanide
Fluoride
Hydroxide (15%)
Hypochlorite
Nitrate
Perborate
Persulfate

Sulfate
Brine Solution
Water
Cyanide
(15%)
Hydroxide
Hypochlorite
Iodide
Sodium Nitrate
Sodium Sulfate
Sodium Sulfite
Sour Crude Oil
Stearic Acid
Sulfated Detergents
Sulfur
Sulfur Dioxide (dry)
Sulfur Dioxide (gas)
Sulfur Dioxide (wet)
Sulfur Dioxide (liquid)
Sulfuric Acid—(60%)
Sulfurous Acid—(60%)
Tannic Acid
Tannic Chloride
Tanning Liquors
Tartaric Acid
Tetraethyl Lead
Thread Cutting Oils
Tomato Juice
Toxaphene (10% in xylene)
Trichloroacetic Acid
Triethanolamine
Triethylamine
Trisodium Phosphate
Turpentine
Urea
Urine
Vegetable Oil
Vinegar
Water Acid Mine
Water—Demineralized
Water—Distilled
Water—Fresh
Water—Salt
Water—Sewage
Whiskey
White Liquor
Wine (20% Alcohol)
Zinc Chloride
Zinc Nitrate
Zinc Sulfate

TEST-PROVEN on over 200 corrosive services

NEW COATED VALVES REPLACE COSTLY ALLOY VALVES

New factory-applied special coatings on Rockwell-Nordstrom standard lubricated plug valves will give you the corrosion resistance benefits of special alloy valves . . . at a fraction of the cost. Now available with K-51[1] and Kanigen[2] coatings, these new coated valves have proven themselves on well over 200 specific services (see list above) which include most caustics, acids and organic or inorganic solvents.

Of course a valve has to do more than just resist corrosion . . . the only real purpose of any valve is to close-off flow. In Rockwell-Nordstrom valves, pressurized lubricant forms a positive pressure barrier against leakage of even lightest gasses . . . and lubrication assures the smooth, easy operation and economy that you just can't expect from anything but a lubricated mechanism.

Get complete details, specifications and application data on the new Rockwell-Nordstrom coated valves in this free booklet. Write: Rockwell Manufacturing Co., Pittsburgh 8, Pa. Canadian Valve Licensee: Peacock Brothers Limited.

1. K-51 (Penton) is a chlorinated polyether of high molecular weight, linear in nature and crystalline in character.

2. Kanigen coatings, applied by General American Transportation Company, is a chemical coating of 90-92% nickel and 8-10% phosphorus.

ROCKWELL-Nordstrom VALVES

another fine product by

ROCKWELL

BAROID RESISTIVITY METER

A transistorized electrical meter for measuring the resistivity of fluids, slurries, muds and filter cakes. Small, lightweight, rugged — built for field use. Single direct scale is easy to read. Conductivity is determined by taking the reciprocal of the resistivity measurement. In leather field case. $165.00

NEW BAROID MUD TESTING INSTRUMENTS *to help you make sure*

BAROID EP MUD TESTER*

Measures extreme pressure lubricating properties of drilling muds. Test results are used to determine amount of mud lubricant additive (Baroid's E P MUDLUBE) needed for makeup or maintenance. Portable for easy field use. $395.00

* PAT. PENDING

ORDER FROM
EQUIPMENT DEPARTMENT

BAROID

5986

BAROID DIVISION
NATIONAL LEAD CO.
Main Office: P.O. Box 1675, Houston 1, Texas

They Say—

Rooted in the Kremlin?

Dear Sir:

Your excellent article, "Easy Glum, Easy Glow," (Journally Speaking, Aug. 10, p. 51) impels me to focus attention on the major cause of the present difficulties facing us in the industry and the imminence of still greater disasters to come.

The root of our trouble is to be found in the Kremlin, the survival and growing power of the communist regime in Russia, and the inability or unwillingness of our paid Washington servants to cope with it in the only manner possible to avert a shooting war.

The red Soviet imperialism is out to destroy us economically and physically. Our industry is affected directly because the Soviets have roped off from us at least 40% of the world's consumers for our petroleum products.

Middle East oil could have been moving in the direction of the east instead of to our shores, where it has forced our own production to be curtailed drastically.

J. Anthony Marcus
J. Anthony Marcus & Associates
New York

Minus a plus

Dear Sir:

I was rather interested in your article, "Sonic Log Applications" (OGJ, Aug. 3, p. 74). However, I noticed a typographical error in the equation on page 74.

The equation reads:

$$200y = 200(2x) - 50y$$
$$x = 0.375y$$

In order for x to equal 0.375y, the equation would have to read:

$$200y = 200(2x) + 50y$$
$$x = 0.375y$$

The answer to the equation printed on page 74 would give x a value of 0.625y.

Patricia Henlin
Maspeth, N. Y.

(Editor's note: Thanks to Reader

the OIL AND GAS JOURNAL

TULSA OFFICE
211 South Cheyenne Avenue
Box 1260
Phone LUther 4-4411

George H. Weber ..... Editor
Henry D. Ralph .. Chief Editorial Writer
Ted A. Armstrong ..... News Editor
Gerald L. Farrar .... Engineering Editor
Frank J. Gardner .... Exploration Editor
Paul Reed ..... Pipeline Editor
W. L. Nelson ..... Technical Editor
Lynn M. Nichols .... Presentation Editor
John C. Reidel .... Petrochemical Editor
John C. Casper ..... Economics Editor
W. B. Bleakley ..... Production Editor
Neil Williams ..... Associate Editor
Peter B. Bike ..... Geophysical Editor
Carl J. Lawrence ... Asst. News Editor
Gene T. Kinney ... Asst. Pipeline Editor
R. B. Tuttle ..... Equipment Editor
C. Dudley Johnston ..... Art Director
Robert B. Bizal ..... Editorial Research
Carl Hoot ..... District Editor
John C. McCaslin ..... District Editor
W. A. Bachman ..... District Editor
Deacon New ..... District Editor
Merle F. Blakely ..... District Editor
Sara Bangert ..... District Editor
John H. Hyden ..... District Editor
Max L. Batchelder .... Asst. Pres. Editor
Helen Brown ..... Editorial Assistant
Alice Burt ..... Editorial Assistant
Aileen Cantrell ..... Editorial Assistant
Susan Boeckman ..... Editorial Assistant
Margaret Higgs ..... Editorial Assistant
Jo Jeanne Speaker ..... Staff Artist
E. P. Stadler ..... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910

Paul Swain ..... International Editor
Larry Resen ..... Refining Editor
Ray G. Gibson ..... District Editor
John P. O'Donnell ..... District Editor

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726

Ed McGhee ..... Drilling Editor
Howard M. Wilson ..... District Editor

DALLAS OFFICE
1238 Mercantile Building
Phone Riverside 8-3074

Robert J. Enright ..... District Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722

D. H. Stormont ..... West Coast Editor
William T. Smith ..... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Joe Reilly ..... Washington Editor

BUSINESS STAFF

P. C. Lauinger ..... President

S. H. Rourke .... Executive Vice President
Mitchell Tucker . Vice Pres. and Adv. Mgr.
Kenneth B. Barnes . V.P. and Edit. Director
Hanson B. Pigman .. Circulation Manager
Donald W. Wilson .. Mgr. Industry Census
J. Parker Holland .. Production Manager

ADVERTISING STAFF

TULSA OFFICE
211 South Cheyenne Avenue
Phone LUther 4-4411

John D. Reilly .. Mid-Continent Manager
Roy E. Finley ..... Representative
D. B. Miller ..... Classified Adv. Mgr.

PHILADELPHIA OFFICE
1059 Land Title Building
Broad and Chestnut Streets
LOcust 3-0118

John W. Meany, Jr. ... District Manager

PITTSBURGH OFFICE
Law & Finance Building, 429 Fourth Ave.
Room 1505, GRant 1-5847

Ernest S. Holzworth .... District Manager

DETROIT OFFICE
204 Washington Square Building
Royal Oak, Mich., Lincoln 7-9455

John D. Yoder ..... District Manager

LOS ANGELES OFFICE
650 South Grand Avenue, MAdison 2-0722

George O. Ruppert .... District Manager

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910

E. S. Klappenbach .... Eastern Manager
Harry B. Bullen ..... Representative

CHICAGO OFFICE
105 West Madison Street
Phone CEntral 6-2537

David T. Kenney ..... District Manager
Karel Wegkamp ..... District Manager

HOUSTON OFFICE
802 American Investors Building
CApitol 4-7726

John M. Spears .... Gulf Coast Manager

DALLAS OFFICE
1238 Mercantile Building
Riverside 8-3074

Pren G. Hollingsworth .... Representative

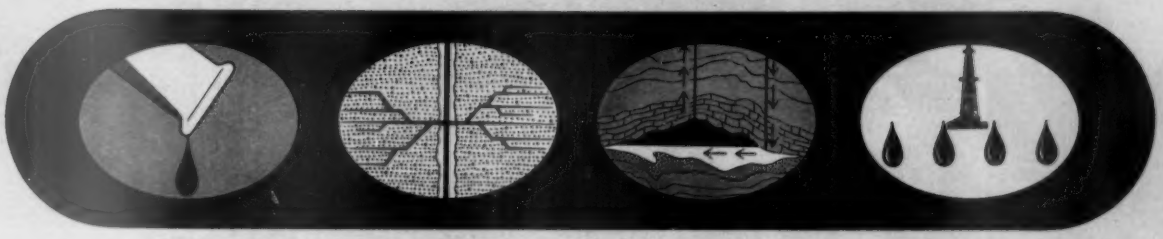
ENGLAND
National Provincial Bank Chambers
15 Grafton Street, Altrincham
Phone Altrincham 3160

Harry Becker .. European Representative

Subscription rates to the petroleum industry United States and foreign, 1 year, $5.00; 2 years $8.00; 3 years, $10.00. Single copies $1.00. Back copies when over a year old, $2.00.

Member
Audit Bureau of Circulations
Associated Business Papers

TREATING . . . FRACTURING . . . WATER FLOODING . . . PRODUCING . . .

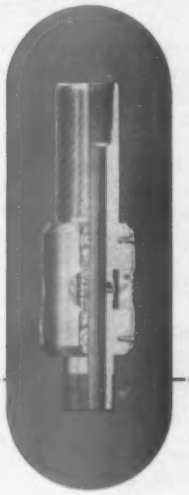


HALLIBURTON'S R-3 TREATING PACKER!

has UNEQUALLED VERSATILITY

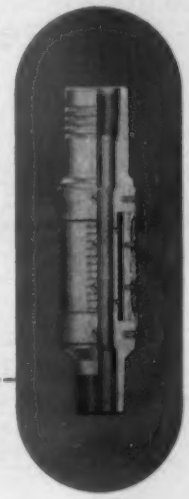
EFFICIENT VERSATILITY... A short, compact, retrievable packer designed for use in treating, fracturing, water flooding or producing wells. Simple in design... easy to operate, low in cost... may be set and re-set as many times as desired on one trip in hole, or moved from well to well. Redressing and replacement of parts is simple. The full opening R-3 packer permits passage of wireline tools, instruments or perforating guns. A built-in safety joint allows tubing to be removed... is easy to drill out, if conditions prevent normal removal.

ESPECIALLY USEFUL IN SHALLOW OR LOW-FLUID WELLS... Run primarily as an upside-down hook wall packer; the R-3 is self-anchoring with no tubing hold down required when run as a tension packer. The packer seal rubbers are available in different durometer hardness to suit various conditions.



Round Slip Type

THE HALLIBURTON HYDRAULIC TUBING HOLD DOWN... Used with R-3 Treating Packers when set in compression helps prevent upward movement of the tubing caused by the lifting force applied below the packer. The holding power of the tubing hold down is proportional to the lifting force. Halliburton Hydraulic Tubing Hold Downs are available in two types: Round Slip Type and Long Slip Type. Both have identical features, except the Long Slip Type has rectangular slips with greatly increased area for maximum holding power. The setting and releasing of the slips are controlled by tubing pressure in each; both incorporate case hardened slip wickers, fishing neck on top of tool, durable synthetic rubber seal pads, and are easily serviced.



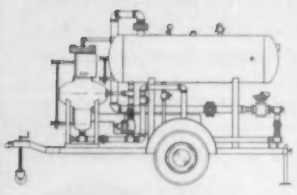
Long Slip Type

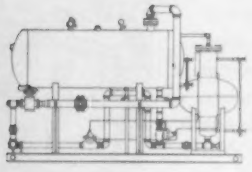
The R-3 Treating Packer is available in 4½", 5½" and 7" O.D. casing sizes. Get this versatile, economical tool from any Halliburton Representative.

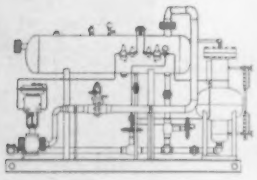
HALLIBURTON
CEMENTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY
DUNCAN, OKLAHOMA

284 SERVICE CENTERS—JUST MINUTES AWAY FROM YOUR WELL







Here's a form of AUTOMATION every field can afford . . .

Rolo Wellcheckers provide limited automation in fields where existing facilities and small production do not justify complete, automatic sequence well test systems.

These packaged units incorporate everything necessary for accurate, metered well tests: test separators, dump-type oil meters and gas metering facilities. Accessories include free water knockouts, dump-type water meters, and Rolo Automatic Samplers for determining water and sediment cut.

All functions are automatic; just switch the well into the Wellchecker, and it automatically separates and meters the oil, water and gas production. The pumper has only to read meters at the end of the test. There's even a Production Time Recorder available to chart production versus time, making attendance at the end of the test period unnecessary. These automatic features give you *more* tests per month and make it easy to meet well-testing schedules.

Wellcheckers are available trailer mounted or skid mounted. Portable Wellcheckers are easily transported for tests at the wellhead. Both permanent and portable units serve at central stations so that wells can be switched through them. Wellcheckers are invaluable in making drillstem tests, too.

Metering is the heart of production automation systems . . . Rolo Wellcheckers offer limited automation on a quick-payout basis, by:

- **freeing test tanks for additional storage facilities**
- **freeing pumpers from testing chores**
- **allowing more tests per month**
- **assuring maximum accuracy in well test measurements**

BETHLEHEM STEEL

In the U. S., contact your nearest Bethlehem representative for information and prices on Rolo products. In Canada and for export, see below.

Rolo

BETHLEHEM STEEL COMPANY
SUPPLY DIVISION
General Offices: 21 E. Second St., Tulsa, Okla.

ROLO MANUFACTURING COMPANY
P. O. Box 22126, Houston 27, Texas
Canada: Petro-Automation Industries, Ltd., Edmonton, Calgary and Regina
Export: R. S. Stokvis & Sons, New York, N. Y.

Henlin for pointing out this error. The equation, correctly stated, should have a plus instead of a minus sign.)

Inflationary price tag

"A factor that has and will continue to exert a significant influence on future gas cost is inflation.

"Even if the expansion for the next decade were made with 1959 dollars it would exert an upward influence on prices since most of the facilities in use today were built in past years when costs were lower. If the expansion is subjected to further inflation in cost, the effect will be multiplied.

"This year the Columbia Gas System is spending $95 million for new construction. If 1947 prices prevailed today, the facilities we are planning to install would cost only $52 million.

"Over the period since 1947, inflation has added a total of $210 million to Columbia's construction costs with a corresponding effect on the price we must receive for our gas. Inflation has also had significant impact on operating costs, principally in increased labor costs which must also be reflected in the price we receive for gas."

C. E. Loomis, senior vice president, Columbia Gas System, Inc., in a speech to the National Association of Purchasing Agents.

Slower rate expected

"It is interesting to observe that the preponderance of gas industry growth in the last decade has represented intensive development rather than extensive growth.

"The absolute growth in demand for gas in established natural-gas areas such as the Appalachian region and the Southwest has been substantially greater than growth in new markets. New markets take time to develop to their maximum, and major expansion of demand still lies ahead for those areas which received natural gas initially during the last 10 years.

"Of course, one cannot expect a rate of growth in the future matching the rate of the past 10 years. Our industry doubled its sales in the past 10 years; it may take 12 years to double them again."

J. Theodore Wolfe, president American Gas Association, and president, Baltimore Gas & Electric Co., in a speech to the New York Society of Security Analysts.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

WECO AIR-O-UNIONS

Perfect for low pressure lines

WECO Air-O-Unions have everything you want in quick, easy make-up, perfect sealing unions for low pressure lines, such as mud suction and return lines; for connecting mud tanks and other services where fluid pressures are low.

No bolts, nuts or wrenches are required. No close line-ups are necessary. Just a shot of air seals the inflatable tube . . . deflating it releases the seal for break-out.

With WECO Air-O-Unions permanently welded in place on your mud tanks, suction and return lines and fittings, mud systems are set up with less time, trouble and cost than ever before. Switch to low cost, time-saving, simple Air-O-Unions on all of your low pressure lines. They are available in sizes 6" through 16".

Your Supply Store has WECO Air-O-Unions . . . or ask your WECO or Chiksan representative.

WECO

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY a subsidiary of FOOD MACHINERY AND CHEMICAL CORPORATION

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

AO-3 59

New Kidde carbon dioxide portables awarded highest U.L. rating!

Belleville, N. J. — A spokesman for Walter Kidde & Company announced here today that four of the company's new portable fire extinguishers have been awarded the Underwriters' Laboratories highest ratings for their respective capacities. To those interested in fire safety, this means that, pound for pound, these new Kidde units have more fire-killing power than any other carbon dioxide extinguishers on the market today.

Available in 15 and 20 pound capacities, in either squeeze valve or trigger models, these power-packed Kidde units feature new hose and discharge horn assemblies, which are responsible for their extra fire fighting ability. The new assembly is supplied also with Kidde's 10 pound carbon dioxide portable which has a U. L. rating not exceeded by any other extinguisher of its capacity. This hose-horn combination is also being offered as a replacement unit for existing 10, 15 and 20 pound carbon dioxide units, and when attached will upgrade their effectiveness equal to the new ratings.

For more information on these top-rated Kidde carbon dioxide portables write Kidde today.

Kidde

Industrial and Marine Division
Walter Kidde & Company, Inc.
760 Main St., Belleville 9, N. J.
Walter Kidde & Company of Canada Ltd.
Montreal — Toronto — Vancouver

CALENDAR

SEPTEMBER

3-5 Northwestern International Oil Scouts Association, annual meeting, Prince of Wales Hotel, Waterton National Park, B. C.

9-11 American Society of Mechanical Engineers, American Society of Civil Engineers, West Coast conference of applied mechanics, Stanford, Calif.

9-11 Pacific Coast Gas Association, annual meeting, Ambassador Hotel, Los Angeles.

9-12 Intermountain Association of Petroleum Geologists, annual field conference, western high Uintas, registration September 9, Provo, Utah.

10-12 Magic Plains Oil Exposition, Borger, Tex.

14 American Petroleum Institute, University of Texas, seventh session of school of pipeline technology, Lee College, Baytown, Tex.

14-16 Texas Mid-Continent Oil and Gas Association, annual meeting, Rice Hotel, Houston.

15-16 American Gas Association, Southern Gas Association, eleventh annual accident prevention conference, Dinkler Plaza Hotel, Atlanta.

16-18 Wyoming Geological Association field conference, Big Horn Basin, registration, Cody, Wyo.

16-18 National Petroleum Association, annual meeting, Traymore Hotel, Atlantic City, N. J.

17 Natural Gasoline Association of America, Rocky Mountain regional meeting, Wyoming-Gladstone Hotel, Casper, Wyo.

17 American Gas Association, second annual pipeline research forum, Statler Hotel, Dallas.

17-18 International Seminar on Friction, Lubrication and Wear, Burgenstock, Switzerland.

18-19 Ardmore, Okla., Geological Society, field trip in southeastern and eastern Oklahoma, registration Sept. 17, Aldridge Hotel, McAlester, Okla.

20-23 American Society of Mechanical Engineers, petroleum mechanical engineering conference, Rice Hotel, Houston.

21-23 Texas Society of Certified Public Accountants, sixth annual institute on taxation, Houston.

21-23 Columbia University, oil refinery workshop on passive element analog computers, Engineering Building, Columbia University, New York.

21-25 Instrument Society of America, annual instrument-automation conference and exhibit, International Amphitheater, Chicago.

22-23 National Association of Corrosion Engineers, Shreveport, La., section, eighth annual corrosion control short course, Centenary College, Shreveport.

23-24 Western Petroleum Refiners Association, Rocky Mountain regional technical - industrial relations meeting, Henning Hotel, Casper, Wyo.

24-25 Mid-Continent Oil and Gas Association, Louisiana-Arkansas division annual meeting, Roosevelt Hotel, New Orleans.

27-29 National Association of Oil Equipment Jobbers, annual convention and trade show, Hotel Leamington, Minneapolis.

27-30 American Institute of Chemical Engineers, national meeting, Hotel St. Paul, St. Paul.

29-30 Western Petroleum Refiners Asso-

VISCO
REG. U.S. PAT. OFF.
OIL TREATING
507
COMPOUND
55 U. S. GALLONS
VISCO PRODUCTS CO. Inc.
HOUSTON, TEXAS

ciation, management seminar, Western Hills, Wagoner, Okla.

28-Oct. 1 American Welding Society, fall meeting, Sheraton-Cadillac Hotel, Detroit.

29-Oct. 1 National Association of Corrosion Engineers, western region conference, Bakersfield Inn, Bakersfield, Calif.

OCTOBER

1-2 National Association of Corrosion Engineers, southeast region conference, Jacksonville, Fla.

2-3 Association of Desk and Derrick Clubs of North America, eighth annual convention, Hilton Hotel, San Antonio, Tex.

4-7 Society of Petroleum Engineers of AIME, fall meeting, Memorial Auditorium, Dallas, Tex.

5-7 American Gas Association, annual meeting, Conrad Hilton Hotel, Chicago.

5-7 National Association of Corrosion Engineers, northeast region conference, Lord Baltimore Hotel, Baltimore.

5-10 Society of Automotive Engineers, national aeronautic meeting, aircraft engineering forum, and aircraft engineering display, The Ambassador, Los Angeles.

7-8 Western Petroleum Refiners Association, fourth annual stream pollution and waste disposal conference, Broadview Hotel, Wichita.

7-10 Rocky Mountain Association of Geologists, eleventh annual field conference, Saratoga Inn, Saratoga, Wyo.

8-9 California Natural Gasoline Association, annual fall meeting, Huntington-Sheraton Hotel, Pasadena, Calif.

8-10 American Association of Petroleum Geologists, Southwestern Federation of Geological Societies, second annual regional meeting, Coliseum, Lubbock, Tex.

8-10 Exploration Drilling symposium, sponsored by University of Minnesota, Colorado School of Mines, and Pennsylvania State University, University Park, Pa.

8-11 Louisiana Gulf Coast Oil Exposition, Lafayette, La.

11-13 American Association of Oilwell Drilling Contractors, annual meeting, Skirvin Hotel, Oklahoma City.

11-16 American Society for Testing Materials, Pacific area national meeting, Sheraton-Palace Hotel, San Francisco.

12-15 National Association of Corrosion Engineers, south central region conference, Cosmopolitan Hotel, Denver.

13-14 Seventh Annual Gas Measurements Institute, National Guard Armory, Liberal, Kans.

16-17 University of Texas, E. P. Schoch lecture series, process control, University of Texas, Austin.

20-22 American Standards Association, national conference on standards, Sheraton-Cadillac Hotel, Detroit.

20-22 National Association of Corrosion Engineers, north central region conference, Cleveland.

20-22 American Society of Mechanical Engineers, American Society of Lubricating Engineers, lubrication conference, Sheraton-McAlpin Hotel, New York.

22-23 American Institute of Mining, Metallurgical, and Petroleum Engineers, Los Angeles Basin section, fall meeting, Huntington Sheraton Hotel, Pasadena, Calif.

23 Natural Gasoline Association of America, southern regional meeting, Carlton Hotel, Tyler, Tex.

26-27 Independent Petroleum Association of America, annual meeting, Statler-Hilton Hotel, Dallas.

26-27 Independent Natural Gas Association of America, annual meeting, Westward Ho Hotel, Phoenix.

26-28 Society of Automotive Engineers, national transportation meeting, La Salle Hotel, Chicago.

27 American Institute of Chemical Engineers, New York section, technical symposium, Hotel New Yorker, New York.

28-29 Western Petroleum Refiners Association, annual question and answer session on refining technology, Rufus Garrett Hotel, El Dorado, Ark.

28-29 Armour Research Foundation of Illinois Institute of Technology, annual computer applications symposium, Morrison Hotel, Chicago.

28-30 Society of Automotive Engineers, fuels and lubricants meeting, La Salle Hotel, Chicago.

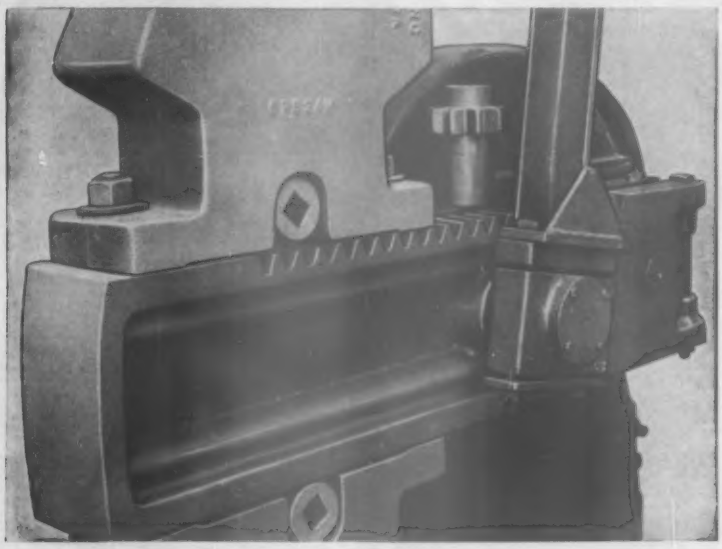
28-30 American Association of Petroleum Geologists, Mid-Continent regional meeting, Broadview Hotel, Wichita.

29-30 Oil Recovery Symposium on Southwest Texas, sponsored by southwest section of AIME and Texas Petroleum Research Committee, Driscoll Hotel, Corpus Christi, Tex.

NOVEMBER

4-6 Rocky Mountain Oil and Gas Association, fourteenth annual convention, Brown Palace Tower, Denver.

4-6 Institute of Radio Engineers, national automatic control conference, Sheraton Hotel, Dallas.



JUST ONE MAN

. . . can adjust this Jensen Jack

JENSEN'S unique rack and pinion counterbalance system allows just one man—standing on the ground—to make all necessary weight adjustments, quickly and easily, without any special equipment.

You get cost-saving, *smooth* counterbalance—no matter how deep your well may be.

Get all the facts on JENSEN's Rotary JACK before you buy *any* pumping unit.

STOCKED BY YOUR LOCAL SUPPLY STORE

Made by JENSEN BROS. MFG. CO., INC., P.O. Box 477-F, Coffeyville, Kansas
Export Office: 250 Park Avenue, New York 17, N.Y.

JENSEN JACKS

true resistivity is unique in oil-finding methods

R_t

Today, thirty years after Schlumberger pioneered Electrical Logging, True Resistivity measurements still provide the only logging methods of finding and computing oil saturation in the reservoir.

That's why, through the years, Schlumberger has endeavored to eliminate from resistivity measurements the effects of the borehole, mud invasion, and beds adjacent to the one under study.

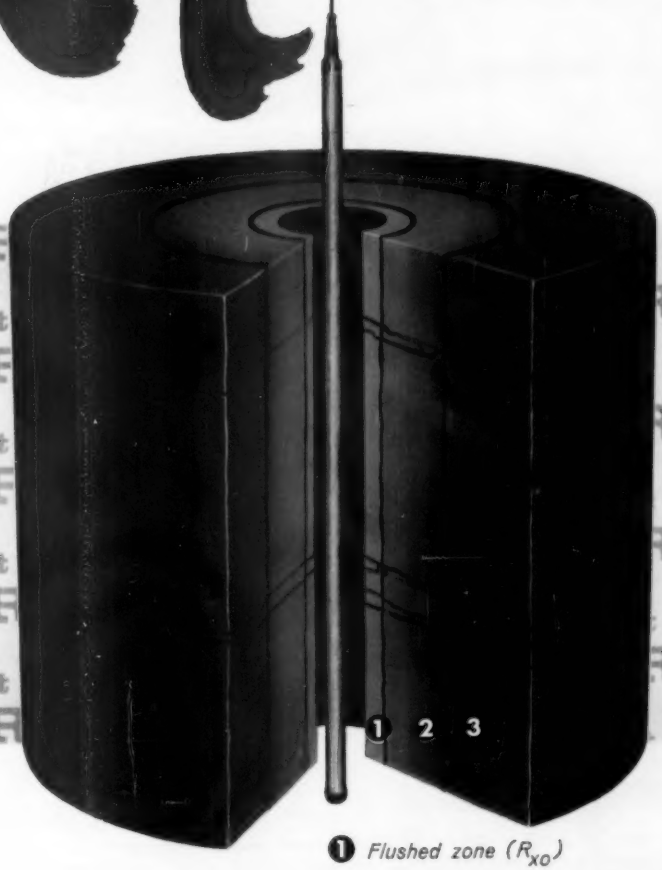
Long-Spacing Electrode Curves, Laterolog, and Induction Log are all Schlumberger developments for True Resistivity Logging. Whether you are drilling in soft or hard formations, thin beds or thick, salt muds or fresh muds, one of these logs has the answers for you.

- *Is the Formation Oil or Gas Bearing?*
- *Is the Saturation Sufficient for Production?*

You will make the right decision more often when you base it on True Resistivity from a Schlumberger Log. Your Schlumberger engineer is trained and qualified to select the right program for you.

THE EYES OF THE OIL INDUSTRY®

SCHLUMBERGER



❶ *Flushed zone (R_{xo})*

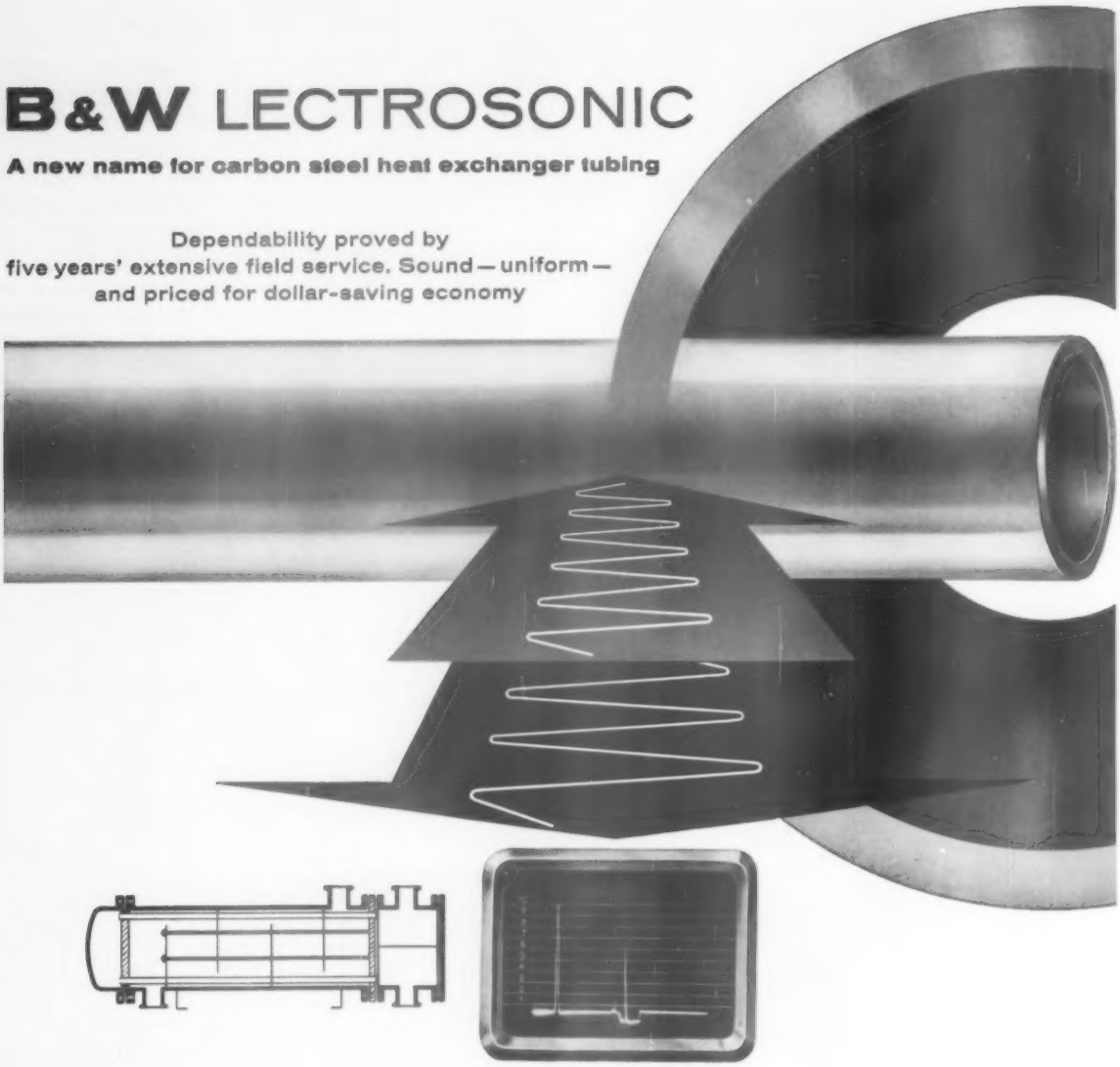
❷ *Invaded zone (R_i)*

❸ *Undisturbed zone (R_t)*

B&W LECTROSONIC

A new name for carbon steel heat exchanger tubing

Dependability proved by
five years' extensive field service. Sound—uniform—
and priced for dollar-saving economy



Now, B&W brings you a new concept in heat exchanger tubing—B&W LECTROSONIC. Produced under the most exacting quality control methods in the industry, LECTROSONIC tubing fits right, and rolls in easily because it's dimensionally accurate, and uniform.

Continuous ultrasonic inspection—plus destructive and hydrostatic testing, visual inspection, and magnetic particle inspection, are five ways used to check the weld of B&W LECTROSONIC Tubing for your assurance of dependability.

B&W LECTROSONIC Tubing was developed to meet the needs of the petrochemical industry for an electric resistance welded carbon steel tube that is easily workable, strong, and less costly than seamless tubing which it is designed to replace.

Produced in all standard sizes. Available now through distributors or direct from B&W.

Write for B&W Bulletin TB-431 for full information, or call your nearest B&W District Sales Office. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pennsylvania.

B&W

THE BABCOCK & WILCOX COMPANY

TUBULAR PRODUCTS DIVISION

TA-9034-WP5

Seamless and welded tubular products, solid extrusions, seamless welding fittings and forged steel flanges—in carbon, alloy and stainless steels and special metals

50 years ago

September 7, 1909

Newly signed contract gives Lone Star Gas Co. gas rights on various properties The Texas Co. owns in North and North Central Texas. The latter company retains oil rights and abandons plan to lay gas pipeline duplicating 16-in. line Lone Star is laying to furnish first natural gas for Fort Worth and Dallas.

Hamilton Switch, or Preston pool, near Okmulgee, in Okmulgee County, opens with indications of being one of best oil discoveries in Oklahoma this year. Fox River Valley Oil & Gas Co.'s discovery well flows 500 bbl. of 37.3°-gravity oil daily from depth of 2,038 ft. Leases ½ mile from well bringing bonuses of $10,000 per acre.

25 years ago

August 30, 1934

Dedication of Drake Memorial Park climaxes 4-day Diamond Jubilee of Oil celebration at Titusville, Pa., commemorating seventy-fifth anniversary of drilling of first commercial oil well, located on park site.

Conroe field in Montgomery County, on Texas Coast, proclaimed as model of good operating practices. Depicted as first field of diversified ownership employing modern efficient and conservative engineering principles.

Damage of $2,800,000, 2 deaths, and many personal injuries result from explosion of 12 large and many small tanks at National Oil Co. (Standard) refinery near Campana, Argentina. More than 100,000,000 gal. of gasoline and oil lost. Catastrophe one of worst in oil industry to date.

10 years ago

September 1, 1949

Shell interests in United States reorganize under new merged corporate setup with newly formed Shell Oil Co. replacing Shell Union Oil Corp. as holding company. Shell Pipe Line Corp. and Shell Chemical Corp. not involved.

First natural gas for New York City area goes into use on Staten Island, Richmond Borough, through new feeder line from terminus of Texas Eastern Transmission Corp.'s Big Inch system lines at Linden, N. J.

Sinclair Oil Corp. launches comprehensive program to expand crude-oil production at least 50,000 bbl. daily over next 5 years.

Pan American Southern Corp. becomes completely integrated concern following merger of Pan American Petroleum Corp. and Root Petroleum Co.

JOURNALLY SPEAKING

In a Hole

WHO FIRST THOUGHT of the idea of storing oil in a hole in the ground?

That may sound like a silly question, but millions of dollars will be at stake when it is argued next March in a federal court in Amarillo.

Cavemen stored things in holes in the ground, so storing oil that way might seem to be just doing what comes naturally. But there's a patent on the idea, and half a hundred oil companies are in danger of being judged infringers.

The gist of the controversy has been chronicled in the Big Yellow Book (Feb 2, p. 58, and Aug. 3, p. 56) but the story behind the story is quite a story.

It seems that during World War II both the oil and gas industry and the military were trying to develop safe and economical ways of storing large quantities of petroleum products. The industry became even more active in the work during the postwar years when winter shortages of gas and fuel oil developed in many consuming areas because of the shortage of transportation capacity during periods of peak demand.

Just about everybody in the industry, apparently, began to think about the problem at the same time. They experimented with storing natural gas and LPG in steel tanks, underground or aboveground, under pressure and under refrigeration. They found that fuel oil could be stored in old quarries or specially mined rock caves. They found that natural gas could be stored in old oil fields or natural anticlines containing salt water.

And they found that oil products and particularly LPG could be stored very nicely in caverns chopped out or washed out of beds of rock salt.

But nobody thought of patenting the idea—nobody, that is, except two men.

One was a Canadian engineer named Reginald L. Pattinson who had worked around the oil, gas, and salt wells of Ontario. He applied for a Canadian patent on storing oil or gas in salt caverns in 1944, and for an American patent in 1945.

The other was Sid W. Richardson, the well-known Fort Worth oil operator. When Richardson got to the U. S. Patent Office he found Pattinson's claims already on file. So the two made a deal, with Pattinson assigning his claims to Richardson.

But the Patent Office decided that storing oil in a hole in the ground wasn't a patentable invention, and refused to issue a patent. So Richardson and Pattinson went to court, got the ruling reversed, and forced the Patent Office to issue the patent. That was in 1952.

Meanwhile dozens of oil companies had been merrily excavating salt caverns and storing LPG and other products in them. It seemed like a spontaneous movement, and nobody gave a thought to who may have originated the idea until the court ordered a patent issued.

There was consternation for a while, but then somebody dug up a 1909 German patent on storing oil in caverns mined in rock salt. This seemed to prove that the idea was old and the new patent no good, so everybody relaxed.

But then Richardson and Pattinson got their patent reissued with narrower claims. It now covers only storage of hydrocarbons in washed-out salt caverns; not the washing process, and not storage in mined caverns.

So there the patent is, and companies that have been using the idea without paying royalties are on the defensive.

We don't know what evidence these companies will present at the Amarillo trial, but we do know that some of them have been scouting widely for anything that might make the patent invalid by showing that somebody else thought of the idea of storing oil in a hole in the ground before Richardson and Pattinson did in 1944.

If the patent is upheld and the defendants are adjudged infringers, a lot of oil companies may find that putting oil in a hole also puts them in a legal hole and financial hole.

—Henry D. Ralph.

MAKE YOUR WELLS WORTH MORE

Let Dowell Engineer Your Frac Jobs With "Frac Guide"

Now operators are getting far better results and a much higher percentage of successful fracture treatments than they were only six months ago. These results include faster payout, lower lifting costs, higher production increases and better decline curves. Perhaps you can benefit, too. Ask your Dowell representative to use the "Frac Guide*" to design the most profitable treatment for your well.

What The "Frac Guide" Can Do For You

The Dowell engineer will want to take into consideration as many of these factors as possible:

- Depth, thickness, permeability and porosity of producing zone
- Viscosity, gravity and compressibility of reservoir fluid
- Reservoir pressure and bottom-hole temperature
- Previous treatment data — pressures, injection rates and materials.

Then, using the charts and formulas in his manual, he can predict — with reasonable accuracy — the effect of these variables:

- Volume of fluid; amount of sand
- Type of fracturing fluid
- Injection rate
- Addition agents
- Multi-stage treatments.

From these calculations he can engineer the most economical treatment — to help you get the results you want at the greatest net profit to you.

Since he can predict treatment results with greater accuracy, failures with consequent loss of production have been greatly reduced.

Since he can determine the fluid loss of various fracturing fluids, he can select the lowest cost fluid to give the desired fracture area.

Since he can predict the fracture volume with improved accuracy, he can more accurately calculate the amount of sand required to give a fully packed fracture. This reduces the healing of fractures and maintains large flow channels for profitable production, slower decline rates and maximum recovery.

Since he can predict injection rates and pressures, he can use high sand concentrations with less danger of unplanned sandouts. This helps keep down both fluid and pumping costs.

Just How Good Is The "Frac Guide"

Dowell engineers gave the "Frac Guide" a number of tests before releasing it for general use:

First, they used it to predict treatment results on hundreds of wells. Then, they compared these predicted results with known results of frac jobs already made on the wells. *They discovered that predictions made with the "Frac Guide" closely corresponded with what actually did happen.* More important, they also found many instances where they could have engineered a far more profitable treatment if the "Frac Guide" had been available.

Second, they started designing new treatments using the "Frac Guide." *The success ratio jumped from less than 60 to 97 per cent on the first 300 jobs.* Results were also far better than from previous treatments on similar wells.

Really engineered fracturing with the "Frac Guide" was pioneered by Dowell, so Dowell has the greatest backlog of experience in the industry. Call your nearest Dowell engineer for more information. Get him to *engineer* the treatment for your next well. There is no additional cost. Dowell has more than 165 offices and stations in the United States, Canada, Venezuela and Argentina. Dowell, Tulsa 1, Oklahoma.

*Dowell Trademark

Services for the oil industry

DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

Here are examples of the type of results that are being

In the Texas and Oklahoma Panhandles —

—16 treatments were engineered with the "Frac Guide." These treatments produced production increases that averaged 63 per cent better than those obtained by previous treatments on similar wells. In many wells, treatment costs with the "Frac Guide" averaged 20 to 30 per cent less than costs on previous treatments. The improved production increases meant faster payouts and more profitable wells.

In the Denver Julesburg Basin —

—treatments engineered with the "Frac Guide" have been used in both the "D" and "J" sands. Generally, payout time on these jobs has been about half that of previous treatments because the desired amount of sand can be put away with less refined oil. For example, two treatments into the "J" sand were compared. Payout time for the job using the "Frac Guide" was only 100 days as compared to 186 days for the other job. In another study of two treatments, the cost of the job using the "Frac Guide" was about $2000 less, and payout time was more than 50 per cent less.

In Northern Oklahoma —

—40 wells treated with the "Frac Guide" were compared with other fractured wells. The jobs using the "Frac Guide" cost about 15 per cent more but allowed the use of 50 per cent more sand. Initial potentials of the wells treated with the "Frac Guide" were higher, and decline curves are expected to be flatter.

In Southern Oklahoma —

—the "Frac Guide" has permitted the use of water-base fluids instead of more expensive fracturing fluids. Many wells have been treated with four-cent-per-gallon fluids instead of the 10-cent-per-gallon fluids previously used. Many excellent producers have resulted.

In Lea County, New Mexico —

—Lea County wells treated with and without the "Frac Guide" were compared. The wells for which treatments were engineered with the "Frac Guide" averaged 295 bopd flowing, while other fractured wells averaged less than 70 bopd pumping.

Early dawn in the Four Corners area finds operators and Dowell ready to go. Dowell fracturing treatments in formations like the Gallup have been particularly successful.

obtained with the help of "Frac Guide" developed by Dowell

In Crane County, West Texas —

—wells completed in the San Andres have shown much slower decline rates after treatments with the "Frac Guide," even though there were no significant increases in potential.

In Ector County, West Texas —

—a comparison of wells in the Edwards pool was made. Treatments engineered with the "Frac Guide" gave production increases about 40 per cent greater than other treatments in the same field.

In the East Texas-Northern Louisiana area —

—comparisons were made on a control group of eight wells—four wells were treated with the "Frac Guide," and four without. All wells were completed into the Mooringsport formation and were generally similar. Treatment costs for the wells fractured without the "Frac Guide" averaged $4440; and average production test figures rose from 6.5 to 55.5 bopd. When the "Frac Guide" was used, treatment costs dropped to an average of $2904. Average production test figures rose from 8 to 121 bopd. In this case, an average of $1536 was saved per treatment, and results were greatly improved.

In Uintah County, Utah —

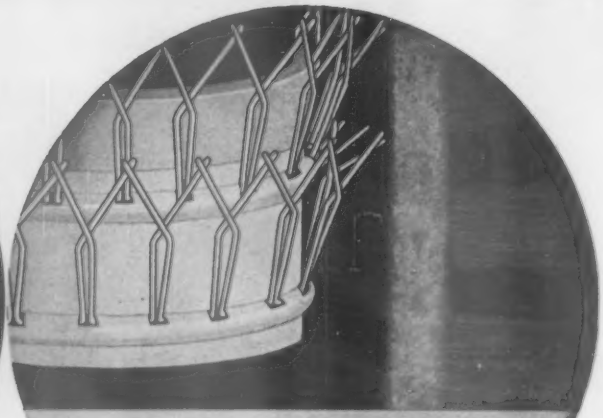
—a well was producing 10 bopd and failed to respond to a fracturing treatment. Another similar well was treated with the aid of the "Frac Guide." This well was also producing 10 bopd before treatment. After fracturing, production shot up to 220 bopd; and the well was still producing 185 bopd—steady—60 days later.

In Converse County, Wyoming —

—two treatments made with the "Frac Guide" were compared with other frac jobs made on the same lease. Previously, rapid production declines to 12 or 15 bopd had made frequent re-treatments necessary. All wells in the field had been pumping. Though the jobs with "Frac Guide" cost about twice as much, production stabilized at about 56 bopd *flowing*, lifting costs were reduced and payout was faster.

BAKER CONTROLLED SCRATCHING

OFFERS MORE THAN EFFECTIVE MUD CAKE REMOVAL

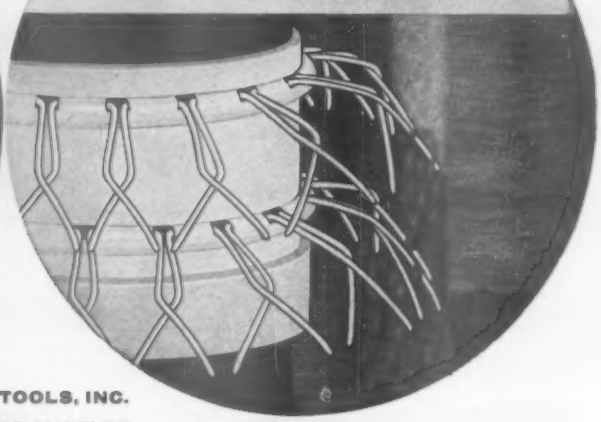


When the casing is being lowered, the scratcher wires swing freely upward and do not remove mud cake which can plug the annulus and cause dangerous pressure surge build-up.

BAKER

After reaching the area to be cemented, the hinged scratcher wires extend to contact the wall of the hole. and when the casing is reciprocated...

...scissors-like operation of the overlapped wires—over the full circumference of the well bore—effectively removes the mud cake which is circulated safely out of the hole.

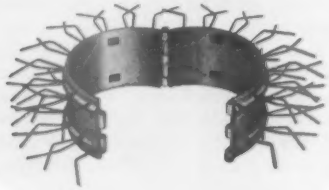


BAKER OIL TOOLS, INC.
HOUSTON/LOS ANGELES
NEW YORK

Controlled Scratching not only means more effective mud cake removal for a better cementing bond, but protects against destructive pressure surges while running casing. Baker Scratchers supplement the pressure-reducing performance of Baker FILL-UP Equipment, and the superior centering action of Baker Casing Centralizers, to provide *more* than a good cement job.

The Baker representative, and your supply store are ready to serve you.

Baker Wall Scratchers are available in the "Solid-Ring Type, (Product No. 901-C) which are slipped *over* the casing; and the "Hinge-Lok" (Product No. 900-C) which fastens *around* the casing. Both types can be positioned with either Solid or Split-Ring Baker no-weld Stop Rings to avoid harmful welding on casing.



The conservation cause needs more crusading

SOMEBODY ought to be carrying a torch for oil conservation. The cause seems to be languishing just at a time when it should be most active.

A large part of the public is seriously questioning the wisdom of protecting the domestic industry by limitations on oil imports. There are doubts expressed that the industry is efficient enough to merit this protection, or that it can provide adequate oil for national security.

Scientific knowledge of greater and more efficient recovery has run way ahead of normal producing practices and of most state conservation laws and regulations.

A YEAR AGO the Conservation Forum was organized spontaneously to advance the cause. Its achievements to date suggest that it is on the right track but needs a lot more steam behind it.

A little progress has been made in a few areas toward discouraging the drilling of some unnecessary wells where it can be demonstrated that the operators will immediately profit thereby. But where there are no pressing local spacing problems, there is little enthusiasm for the cause.

Well spacing seems to be the only concern of the forum group so far, yet it is only one of a dozen aspects of the over-all problem of recovering more oil more efficiently and under equitable procedures that will encourage conservation in its broad sense.

This is a missionary job, requiring tireless education, exhortation, and persuasion. But the needed missionary zeal is lacking.

Back in the 1930's the imminent threat of federal control brought rapid adoption of many state conservation laws and the formation of the Interstate Oil Compact Commission. But with that threat quiescent, progress in conservation has slowed to a crawl.

Today the Compact meetings pay ritualistic tribute to past achievements and receive perfunctory status reports, but they generate no inspiration or pressure for progress.

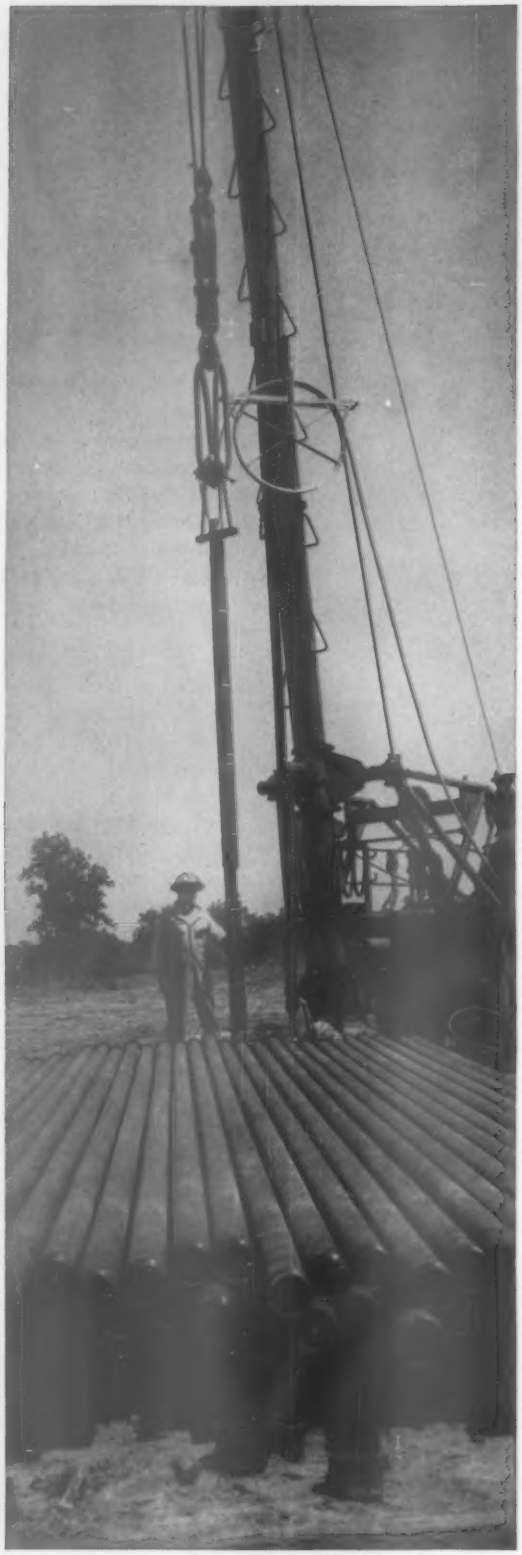
Many of the larger oil states are complacently clinging to regulatory codes and habits improvised a generation ago when the technical and legal concepts of conservation were in their infancy. Some of our newer oil states, with little production yet, have conservation laws that put the one-time pioneers to shame.

WITH THE FEDERAL GOVERNMENT now officially concerned with the adequacy of the nation's oil supply, there should be a renewed push to advance conservation and all its corollaries and implications.

The law, for the most part, is far behind technical and economic knowledge of how to encourage exploration, increase ultimate recovery, and produce more orderly and efficiently. Will it take another threat of federal control to reenergize the cause?

This Submergible Pump handles corrosive salt water for injection. Does its job dependably with "K" Monel alloy pump shaft, Ni-Resist* diffusers, Monel-armored cable. Made by Reda Pump Company, Bartlesville, Oklahoma.

Submergible pump takes long drink of carbonated salt water ...uses "K" Monel shaft



This Reda pump takes a 1400-foot "drink" of carbon dioxide-containing water — economically raises it that distance for injection into a lease in central Oklahoma. The corrosive water doesn't chew up the pump shaft — it's made of "K" Monel* age-hardenable nickel-copper alloy. Turns in extra service, too, because of its extra strength.

The Reda multistage centrifugal pump is widely used to pump oil or water under severe conditions. It pumps sandy wells . . . gassy or paraffin-bearing wells . . . crooked wells. Most of all — corrosive wells.

This pump's "K" Monel alloy shaft and Ni-Resist ductile iron parts make it unusually resistant to corrosion by sulfur-bearing crudes and acidic brines. Together with high capacity and low operating cost, this corrosion-resistance enables the pump to extend greatly economic well life. The cable supplying power to the pump is clad with Monel* nickel-copper alloy tape for extra protection against corrosion and wear.

If you have corrosion problems, you can get tools built with Inco Nickel Alloys at vital points . . . these alloys have excellent strength, too. Check your tool supplier.

See how other producers combat corrosion with Inco Nickel Alloys. Write for "Metals to Make Petroleum Production Equipment Produce More."

*Registered trademark

THE INTERNATIONAL NICKEL CO., INC.
67 Wall Street New York 5, N. Y.

INCO TRADE MARK

INCO NICKEL ALLOYS

Oil Celebrates, Starts Second Century

• Titusville issues a new stamp, buries a time capsule, listens to serious talks, and throws a week-long party to mark successful completion of oil's first 100 years.

LAST WEEK the petroleum industry paused briefly to mark its first Centennial. Then it returned to the business of its second 100 years.

Focal point of celebrations held throughout the country was Titusville, Pa., birthplace of commercial oil production. There, about 200 oil and government executives and a host of western Pennsylvanians swelled the town's population from a normal 9,000 to a perspiring 19,000.

The week-long program was a blend of reminiscence and rural revelry, punctuated by reminders of oil's contributions, its problems, and its responsibilities.

At an Oil Conclave Wednesday an assortment of speakers took serious note of what the industry and its leaders must face tomorrow.

Danger in Taxes . . . Gasoline was ready and waiting when the automotive industry was born, said Arthur C. Butler, director of the National Highway Users Conference.

But it was not until 1911, less than 50 years ago, he noted, that gasoline sales exceeded those of kerosine.

America's incredible strides in what he termed automobility stem from the latter half of oil's first century. This progress is threatened today by excessive taxation, said Butler.

A penny here and a penny there may seem a small thing. But to a wage earner it determines how far and how often he can use his car within a limited budget.

Peace and war . . . In outlining America's growth, keyed to the consumption of petroleum, Oil Import Administrator Capt. M. V. Carson emphasized our complete dependence on oil. One thing is obvious, he said. It is that the United States, perhaps to a greater extent than any other large nation, has given hostage to fortune in its almost complete reliance upon the continued functioning of its countless combustion engines—engines that must gulp oil or fall still.

Even more important, he pointed out, oil is the key to victory in war.

We need to provide the economic and political climate that will stimulate the finding of oil. We owe a great debt to the members of the oil industry and to those pioneers of the industry who are honored here today.

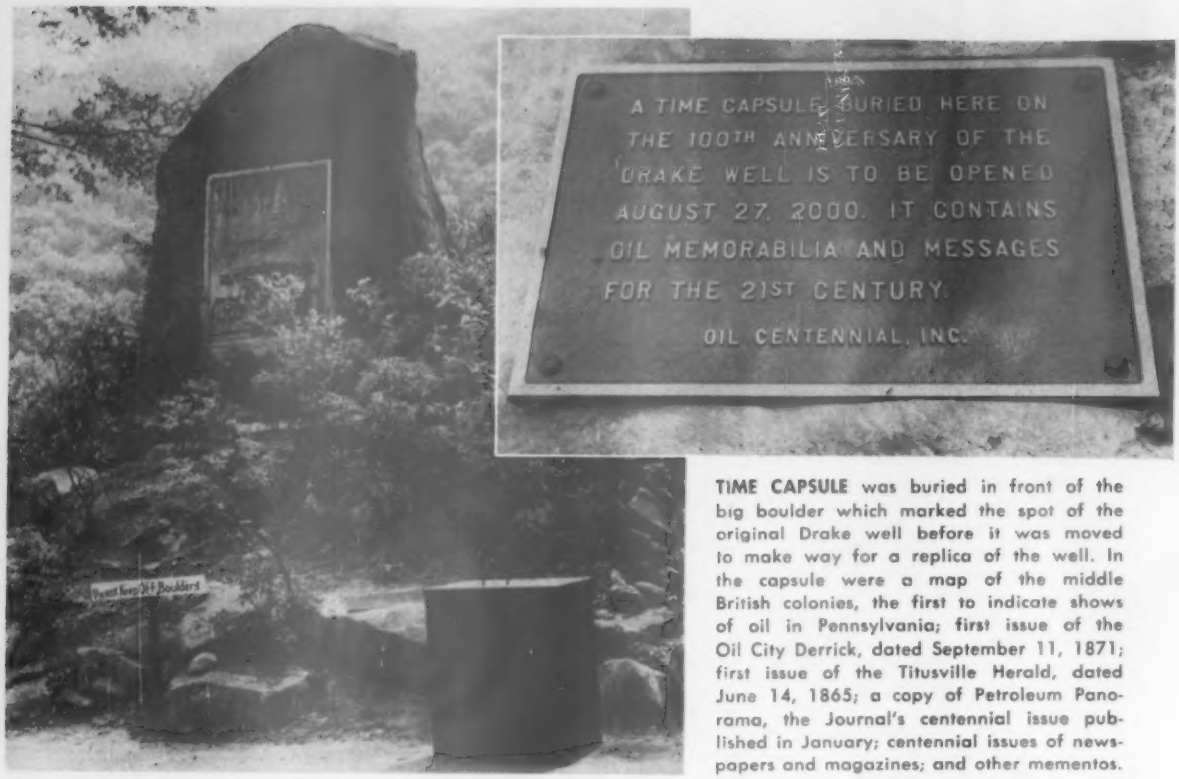
As we look back over two world wars and the prodigious growth of our nation, he concluded, we must realize anew with what foresight President Coolidge wrote in 1924 that "the supremacy of nations may be determined by the possession of available petroleum and its products."

Leslie O. Barnes, president of Allegheny Airlines estimated that aviation, now consuming about 6% of the industry's output could well double that demand within a few years. He predicted that not too far in the future, as yet unknown all-cargo airfleets will provide airlift for all but a few bulk cargoes.

Dr. John Sloan Dickey, president of Dartmouth College, reminded the industry that Drake's discovery and all that followed stemmed from knowledge gained in educational institutions. One hundred and six years ago, he noted, a sample of Pennsylvania rock oil was brought to Dartmouth for examination.

"PRODUCER" was brought in just 150 ft. from the original Drake well. The new well was drilled as a centennial exhibit. It bailed oil from below 144 ft. and flowed enough gas to support a 2-ft. flame.

OFF COME THE QUOTES from "Col." Drake, as a result of the action of the Pennsylvania legislature in making him a real colonel in the state militia. Here, A. C. Thompson, Drake museum curator, wields the chisel.


A TIME CAPSULE BURIED HERE ON
THE 100TH ANNIVERSARY OF THE
DRAKE WELL IS TO BE OPENED
AUGUST 27, 2000. IT CONTAINS
OIL MEMORABILIA AND MESSAGES
FOR THE 21ST CENTURY.
OIL CENTENNIAL, INC.

TIME CAPSULE was buried in front of the big boulder which marked the spot of the original Drake well before it was moved to make way for a replica of the well. In the capsule were a map of the middle British colonies, the first to indicate shows of oil in Pennsylvania; first issue of the Oil City Derrick, dated September 11, 1871; first issue of the Titusville Herald, dated June 14, 1865; a copy of Petroleum Panorama, the Journal's centennial issue published in January; centennial issues of newspapers and magazines; and other mementos.

The results of this analysis and of later studies at Yale launched the first oil company and sent Drake to Titusville.

Dr. Dickey's point: The original knowledge of oil's potential value was not purchased by these promoters. It resulted from previous investments in higher education. Even today, he said, the oil industry cannot look on research as a commodity to be bought in the market. The results of research obtain from better educated individuals throughout America.

Highlights of Thursday:

...The Titusville postoffice canceled and sent out a record volume of first covers bearing the commemorative Oil Centennial 4-center.

The place had been humming for 2 weeks. A local staff bolstered by 50 imported employes was hard-pressed to handle the advance demands. No exact count was immediately available, but it appeared that the volume would exceed 1 million pieces of mail, roughly double that of any other first-day mailing of a U. S. stamp.

...An offset to the Drake well was drilled and ready for shooting before America's TV sets on Thursday morning's "Today" show.

But typically, the industry overproduced even on this gambit. The well came in a week too early. Shows of oil were noted the previous Friday and the well began seeping about 2 bbl. per day from 184 ft.

...President Eisenhower sent the following message to Ned H. Dearborn, Oil Centennial president.

". . . To a Texan, reared in Kansas, now a resident of Pennsylvania, the story of the growth of the oil industry has a particular appeal. But Colonel Drake's first well, begun in the historic tradition of private enterprise, ushered in a century of exciting progress for every American.

"Petroleum and its products are now so basic to our way of life and to our national defense that this centennial imposes a solemn obligation upon us all. We must renew our determination to make the fullest possible use of this vital natural resource for ourselves and for the coming generations.

"I am delighted to add my best wishes for a memorable celebration."

...Gen. E. O. Thompson told an audience Thursday that oil will continue to furnish over 60% of our energy and will be ample for the foreseeable future.

"With the driving force of the oil industry, its aggressive research program, the constant increase in percentage of recovery per reservoir and even more efficient use of its products, I see nothing but a bright future for oil."

Pithole: Ghost Town With People

PEOPLE are again tramping the streets of Pithole.

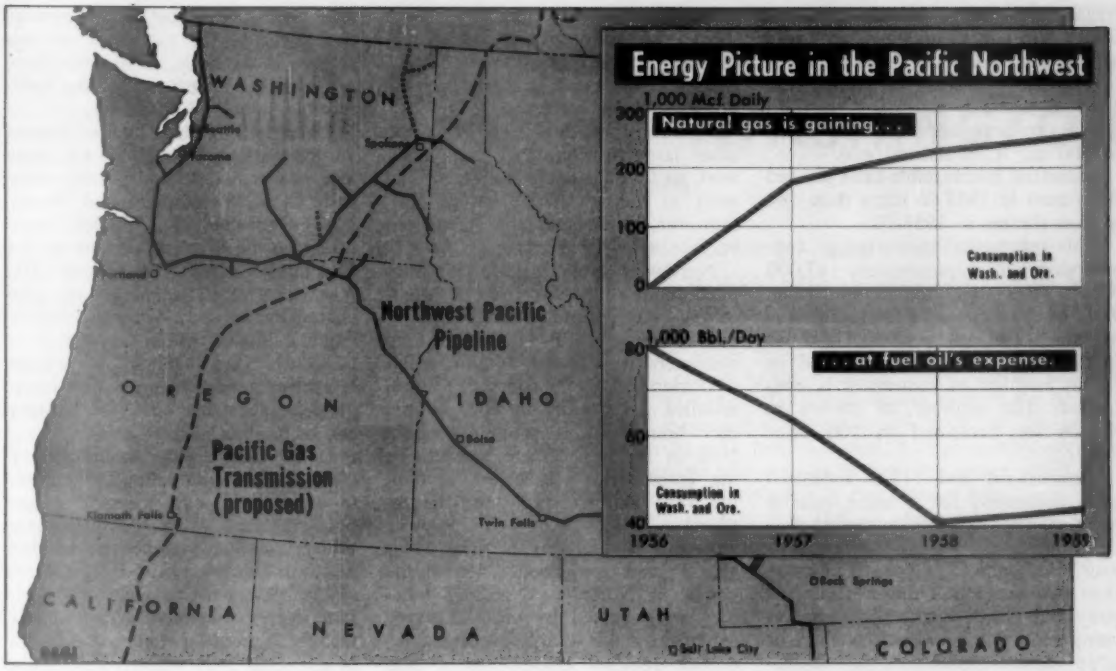
Not a building remains in oil's first big boom town, only a few foundations and cellar holes.

But the streets have been reopened and markers now show points of particular interest, along with original photographs.

Pithole once boasted a population of 15,000, over 50 hotels, the third largest postoffice in the state. It was the site of the first pipeline built by Van Sickle to the railroad a few miles distant.

Responsible for this tourist attraction is James B. Stevenson, publisher of the Titusville Herald and vice chairman of the Pennsylvania Historical and Museum Commission. Last year he bought the site and put Pithole back on the map.

During Drake week a marker was dedicated at the site of the Methodist Church, Pithole's last building, torn down in 1939.



Northwest Gas Out of Toddler Stage

- **In only 3 years, natural gas has captured 10% of the energy market in the Northwest. It has cut heavily into heavy fuel oil sales. Distillates will feel the competition next as suppliers concentrate on residential sales.**

D. H. Stormont
West Coast District Editor

FROM its standing start 3 years ago, natural gas has jumped to the position of a full-fledged fuel in the Pacific Northwest.

Most of the progress has been in the industrial field. Now that a large part of the potential market there has been captured, natural gas suppliers are turning to the residential field.

In terms of petroleum products, this means that heavy fuel oil has felt the brunt of the invasion so far. Now it will be the distillate fuels' turn to defend the market they held through the years when natural gas was not available.

Natural gas started flowing into the Northwest in August 1955 when Pacific Northwest Pipeline Corp. completed its line from the Four Corners area. A year later, gas from Canada's Peace River region also became available through Westcoast Transmission Co.'s 630-mile 30-in. line.

Before natural gas was available, petroleum products supplied about 50% of the total energy demands in Washington and Oregon. Hydroelectric power contributed more than 40%. Only gas available through distribution systems was that manufactured in larger cities. About 170,000 bbl. daily of residual and distillate fuel oils were used in industry and for space heating.

What's happened . . . Three years have made a big change in the energy supply picture.

Consumption of natural gas has jumped from zero to an average of 257,000 M.c.f. daily. This gain has been at the expense of residual fuel. First-half demand for 1958 and 1959 was only about 40,000 bbl. daily, compared with 80,000 bbl. during the first half of 1956.

Demand for distillate fuels has held firm. However, prior to 1956, demand had been increasing at a rate of about 10% annually. Natural gas has wiped out the normal increase accompanying the area's rapid population growth.

Detailed up-to-date figures are not available for the Northwest as a whole, but the experiences of Washington Natural Gas Co. are probably representative of what has happened there.

The largest gas utility in the Northwest, the company serves 28 incorporated communities and suburban areas in the five counties around Seattle and Tacoma. Population of the area served by Washington Natural is over 1,250,000 people, or slightly more than half of the state's total.

Natural gas arrived in its service area in the fall of 1956. The last of its communities was converted to natural gas by the end of December. The data shown in the accompanying table reflect the last full year before natural gas and the 12-month period ended June 30, 1959.

WASHINGTON NATURAL GAS SALES
(Millions of therms annually)

Class of service:	1955	1959
Residential general	5.5	3.9
Residential heating	8.5	29.3
Commercial and firm industrial	12.9	30.2
Industrial interruptible		184.4
Total	26.9	247.7

The most striking figures probably are the totals, showing a ten-fold in-

crease in gas usage. Almost 248 million therms of natural gas were sold in the year ended last June 30, compared with less than 27 million in 1955 (a therm is equivalent to 100,000 B.t.u. or is approximately equal to 100 cu. ft. of natural gas).

Industrial interruptible sales jumped from zero in 1955 to more than 184 million therms in 1958-59.

This represents daily average consumption of approximately 47,000 M.c.f. They amounted to more than 70% of the company's total sales during the 12-month period. That this market was fairly well saturated as far as number of customers is concerned. The number of meters in service has remained at 100 since 1957.

Commercial and firm industrial sales accounted for a much smaller amount. The 30.2 million therms supplied during the last 12 months, however, did represent a growth of more than two and a half times. The company had 12,800 such accounts, as compared with 8,800 at the close of 1955 when manufactured gas was being supplied.

Residential sales for space heating and other domestic uses totaled only slightly more than 33 million therms during the 1958-59 period, or about 13% of total sales. During the 2½ year period natural gas has been available, however, the number of meters has more than tripled.

For Washington and Oregon as a whole, it is estimated that about 60% of the gas used is in the industrial field and the remaining 40% is for domestic and commercial.

Northwest Natural Gas Co., the other large distributor in the Northwest, had a substantial industrial load prior to the advent of natural gas. However, its big increases have been in the industrial field too.

Northwest Natural last year supplied about 80% of the 70,000 M.c.f. of gas daily consumed in Oregon. It also furnished about 11,500 M.c.f. to customers in northwest Washington.

During 1958, Northwest Natural installed gas heating in 60% of the new homes. It is supplying about 30% of the replacement market. In the latter field, oil heaters account for 47% and electricity for the remaining 23%.

Before natural gas became available 3 years ago, about 74% of the homes in Northwest Natural's territory were heated by oil. A survey made early this year, covering a reported 180,000 units, showed that 68% of the units still are oil. Gas was used in 17% and electricity supplied the remainder.

The company is adding about 6,500 gas customers each year. It now is supplying gas to 43,000 homes.

Supply . . . Gas shipments into the area by Pacific Northwest have averaged the same as the daily consumption. Because the carrier is not operating at capacity, it has not been necessary to cut off any of the interruptible industrial load.

During 1958, the pipeline shipped an average of 593,000 M.c.f. daily into western Colorado, Idaho, Oregon, Utah, Washington, and Wyoming. Of this volume, 300,000 M.c.f. was received from Westcoast at the Canadian border. Actually only 210,000 M.c.f. of Canadian gas was purchased by Pacific Northwest. The remaining 90,000 M.c.f. was taken by El Paso Natural Gas Co., Pacific Northwest's parent, on an exchange basis for gas delivered at the southern end of the line.

Of the daily shipments into the region, about 545,000 M.c.f. were sold to other utility companies. Exclusive of the El Paso exchange, Washington utility companies received 135,000 M.c.f. daily. Those in Oregon took about 69,000 M.c.f., and those in Idaho approximately 19,000 M.c.f. Of the remainder, some 140,000 M.c.f. daily was delivered to Colorado Interstate Gas Co. and Mountain Fuel Supply Co. at Green River, Wyo.

Pacific Northwest last year dropped off some 37,000 M.c.f. daily to industrial plants along its route. These ranged from only a few M.c.f. at some plants to more than 15,000 M.c.f. daily at one plant in Lewiston, Idaho. Washington plants bought

Small-Tract Drilling Target of Texas

A HEAVY court attack on drilling of pint-sized tracts in gas fields has been launched in Texas.

Two lawsuits filed in district court at Austin will test the Texas Railroad Commission's authority to reject a secondary-recovery application and to permit small-tract drilling.

One lawsuit was filed by Pan American Petroleum Corp., Michel T. Halbouty, and Meredith & Co., and the other by Pan American alone. Both involve gas production at the Port Acres (Lower Hackberry) field in Jefferson County.

The three-company case charges that a July 6 ruling by the commission will result in physical waste of gas and condensate and should be reversed.

Specifically the commission on July 6 denied an application of the companies to start a unitized cycling program, including construction of a $7-million cycling plant to increase recovery by 7,136,000 bbl. of liquids over present depletion operations. The companies said the denial would cause a $20-million loss.

The commission also refused to change the allocation formula based on two-thirds acreage and one-third well. The companies contended the formula should be based solely on net acre-feet because the ⅔-⅓ formula gives small-tract operators an undue advantage and encourages excessive drilling.

Pan American said it had presented conclusive evidence at a hearing last April that the original bottom-hole pressure in the Port Acres field is declining at the rate of 3.5 psi. daily. This will cause retrograde condensation to occur to an increasing degree at the pressure declines. The dew point already has been reached.

The lawsuit asks that the commission be enjoined from allowing further gas production until it issues an order requiring pressure be maintained at a point which will prevent waste. Also it asks that the commission be prevented from continuing the ⅔-⅓ allocation formula now in effect.

According to the petition, the field, discovered in 1957, had 435 billion cubic feet of gas and 24 million barrels of condensate. Bottom-hole pressure at that time was 9,015 psi. Pressure has now dropped to 8,400 psi.

Only 12.48 million barrels of condensate or 52% can be recovered under the commission's current orders, the petition said, and the remaining 48% will be lost. Under the cycling program, the recovery would be 19.616 million barrels.

Rule 37 attacked . . . The second lawsuit, filed only by Pan American, is a direct attack on Rule 37, under which exceptions to regular well-spacing patterns are allowed for small tracts.

It attacks 24 permits issued by the commission under Rule 37 to small-tract drillers. Wells drilled under these permits, Pan American said, will cause waste and drain tremendous quantities of gas from Pan American's properties in violation of its cor-

about 11,400 M.c.f. daily from the carrier.

The carrier received an average of 29.2 cents per 1,000 cu. ft. for gas sold to other utilities. The range was between 27.1 and 37.6 cents. The company received an average of 37.6 cents for that sold direct to industry.

What's ahead . . . In the 3 years it has been available, natural gas has become the source of about 10% of the Northwest's energy requirements.

Since this compares with 35% in neighboring California, there is still much room for growth.

The industrial load will continue to gain but the big potential market is for residential heating. In the Seattle-Tacoma area alone there are some 400,000 potential customers, using a ratio of one gas meter for every 3.5 persons. Some of this potential is too isolated to warrant extension of gas mains but Washington Natural can expect a several-fold growth in its 30,000 space-heating customers.

From the source of supply viewpoint, the Northwest is expected to become more and more dependent upon Canadian gas. During the first half of this year, the 210,000 M.c.f. purchased from Westcoast amounted to almost 50% of its total purchases. When Westcoast's 36-in. carrier from Alberta to Spokane is installed, there will be no need for Rocky Mountain gas to move into the Northwest.

Legal Attack

relative rights. Regular spacing is 160 acres. Twenty-three regular permits covered 3,699 acres, while 24 permits under Rule 37 covered only 273 acres.

Granting of the permits has created an emergency involving the entire field, the petition states, and therefore all such permits should be canceled. The commission would be prevented from granting any new permits until it has issued an order assuring orderly drilling, development, and operation of the field.

So far, court attacks on Rule 37 have failed. Last February District Judge Charles O. Betts at Austin upheld a small-tract drilling permit in the Normanna gas field, Bee County.

In April, Pan American filed a lawsuit in Austin seeking to reverse a commission order under which West Texas Gathering Co. must follow the commission's field allocation formula in taking gas from Emperor field in West Texas. The pipeline firm offered a contract based 100% on acreage.

watching WASHINGTON

Clyde La Motte

• Congress thinks of home . . . and elections . . .

CONGRESS IS IN A HURRY NOW, wanting to go home. A few pieces of major legislation, including highway financing, must be wrapped up. The rest will be swept under the rug until next year.

Oil hasn't fared badly, either from legislation or from congressional investigations. Credit this chiefly to the moderate tone Congress adopted.

The chief setback to oil was the President's recent veto of the Alaskan leasing measure. Other lease-reform proposals are likely to die on the vine now, too. All, that is, with this exception: Congress may yet pass a provision to protect persons who innocently acquired leases which were originally obtained by others in violation of the acreage limitations.

There is some possibility, too, that H.R. 5, designed to spur U. S. investments abroad, may make it through the hopper. But time is running short.

• Transacting a merger in a goldfish bowl . . .

MERGERS MAY SOON FACE a new stumbling block. The Securities and Exchange Commission has proposed a rule which would out-do the 60-day pre-merger notification legislation which Congress has been considering but hasn't passed.

The pending SEC rule would require a report on agreements to buy or sell major assets. This would be done by the tenth day of the month after an agreement was reached.

Apparently this would include conditional contracts, which often are signed months before a tentative merger becomes an actuality. And the SEC would make this information available to the public. (Under the proposed pre-merger notification legislation, such information would be kept secret.)

Several companies, including some oil firms, have protested to the SEC. Their objection: Making such information public prematurely could unnecessarily endanger legitimate transactions. Competitors, stock speculators, and others would get valuable "inside" information. Customer and employe relationships could be upset—even though the deal failed to materialize.

There is speculation that the Justice Department or the Federal Trade Commission, fearful that Congress isn't going to act on the pre-merger notification legislation, may have encouraged the SEC to take this step. In this way, antitrusters could reach their goal by administrative action. The SEC will accept comments until September 17, then decide whether to adopt the rule. If you write the agency, refer to the proposad rule changes affecting reports filed on Form 8-K.

• Some multistate taxing may be avoided . . .

CONGRESS MAY do you a tax favor, for a change. Efforts are being pushed to obtain approval of legislation which would specify that a state can tax the income made on sales in that state by an out-of-state firm only when the company has facilities within the taxing state.

Under a Supreme Court ruling made earlier this year, it appeared that a state could apply the tax even when a company merely sent a salesman into a state to take orders. Many states, eager for new tax sources, immediately began considering collecting such taxes.

The tax itself is often insignificant. But the record-keeping, the tax accounting, and the legal work involved could be a sizeable chore, especially for a small firm selling in several states.

Even from the viewpoint of the state, the tax might prove to be impractical. As one tax accountant observed: States aren't likely to try to enforce such a taxing plan if they find they are spending $100 to collect $50.

Texas City Strike Near Boiling Point

• Amoco management threatens to hire nonunion workers if OCAW members fail to return. Both sides restate their basic positions.

THE American Oil Co. refinery strike at Texas City, now 2 months old and reaching the boiling point, shows how mighty disputes often hang on seemingly small differences.

The strike originally was called by the union because it wanted to "freeze" job classifications established 2 years ago.

Oil, Chemical and Atomic Workers International Union, Local 4-449, last week disclosed the full text of a change it wanted in the old work contract, now expired. Management preferred to keep the old contract in effect, and the union struck.

The union's proposed change states that management shall have the right "to prescribe the work to be performed in each job and job classification consistent with the job content as prescribed in job postings as of July 1, 1957, with such descriptions to remain unchanged except by mutual agreement."

The old contract stated that management shall have the right "to prescribe the work to be performed in each job and job classification; and to determine the general requirements, standards, and qualifications necessary to perform each job."

Hold onto jobs . . . The union also wants to change the old contract by dropping a clause giving management the right "to eliminate and add jobs and job classifications."

A. L. Grospiron, secretary-treasurer of the union local, took the position that management should accept the proposal to keep the 2-year-old job postings intact because the company itself made the postings.

In failing to agree with the union, Grospiron said, the company "is reflecting on its own management."

Management has taken the position that the union wants a voice in making job assignments and determining the number of men to be assigned to each function at the refinery. This, said a spokesman, would lead to "featherbedding, make-work" practices.

The company did not comment on the specific proposal of the union that the July 1, 1957, postings be retained as part of the contract. However, it was obvious that management does not want to tie itself down to job assignments and classifications made 2 years ago.

Strike crisis . . . The dispute reached a critical stage last week when the company decided after another fruitless negotiating session, to begin hiring nonunion workers to staff the plant.

In letters to the 1,250 union strikers, Amoco gave the employes until Wednesday of last week to report to work. The deadline later was extended to Saturday.

"If we do not hear from you, we will assume that you do not desire or intend to return to work, and you have decided to continue on strike," the letters said. "Commencing on August 28, we shall hire men to fill any jobs that remain vacant."

The company said it would advertise for workers, and those hired will have permanent jobs.

The union's reply to the back-to-work invitation was a loud "No." A meeting of about 1,180 workers voted unanimously to remain on strike.

At a subsequent meeting last Wednesday, called by back-to-work leaders, the determination of the union to hold fast against the "ultimatum" was reaffirmed.

W. E. Moss, chairman of a 25-member committee seeking to end the strike and return to work, called the meeting to order, but Grospiron took control and persuaded virtually all the 1,200 workers present to leave the building (Carl Nessler Civic Center) and reassemble at the union hall.

The union had urged mass attendance at the back-to-work meeting and then succeeded in killing it. Only seven persons remained when Moss finally got to talk.

The following morning, the company reaffirmed its intention of hiring nonunion workers. An early tabulation indicated about 100 workers plan to take up Amoco's back-to-work offer.

Trouble ahead . . . There were fears that the strike may get out of hand with the hiring of nonunion workers.

Up to now, supervisory personnel has placed the refinery partially on stream and kept it in operation at 75% of its former production rate.

Grospiron said the union has conducted a "peaceful strike" to date, and this is still the official position of the union.

Company reply . . . Plant Superintendent B. F. Babin countered:

"We have the right to operate our business in the face of the strike, and we intend to do so in order to protect our business and to meet our obligations to our customers, our employes, and our stockholders."

Babin said the company has received "countless letters and phone calls" from employes wanting to return to work.

The issue of work assignment and job classification has caused much unrest and several strikes among the nation's refineries over the past several months.

In some cases, management was seeking to change the contract to give it better control of working conditions. In other cases, such as at Texas City, management was seeking to maintain a contract which was satisfactory in the first place. In all cases, the unions lined up on the opposite side.

Buying resumed . . . In other developments:

. . . Full crude buying was resumed by Indiana Oil Purchasing Co. except in Arkansas. Settlement of the strikes at Whiting and Wood River plants of the parent company, Standard Oil Co. (Ind.), reopened a market for the oil. The move affected producers in Texas, Oklahoma, and Kansas.

. . . Cat cracker is back on stream at Indiana Standard's struck Sugar Creek refinery. No progress has been made toward settlement of strike.

. . . Efforts to settle strike at Amoco's El Dorado, Ark., plant also have failed.

Esso Vote Cleared

. . . for bargaining agent at Baton Rouge refinery.

THE WAY was being cleared last week for a bargaining agent election at Esso Standard Oil Co.'s 377,200-bbl. refinery at Baton Rouge.

Esso accepted a National Labor Relations Board proposal settling Teamster union charges of unfair labor practices. By signing the agreement, Esso made possible an election in which four unions seek to represent workers in the nation's largest refinery. The election had been stymied while the charges were pending.

"In signing the settlement agreement," Esso said, "the company does not admit that it has committed any unfair labor practice. The company's reason for signing the agreement is to expedite the NLRB representation election in which our employes may exercise their legal right to select the bargaining agency of their choice."

The Independent Industrial Workers Association (IIWA) has represented the workers in the past. The Baton Rouge Metal Trades Council petitioned the NLRB for an election. The Teamsters and the Oil, Chemical and Atomic Workers unions also are campaigning and will make it a four-way contest.

In signing the statement, Esso withdrew recognition of the IIWA until the election is held. Under the agreement, Esso cannot pay officers or agents of any labor group to attend to union business, nor can it furnish office facilities to a union or deduct union dues from pay checks in the absence of a contract requiring it.

Withdrawal of recognition of the IIWA means also that a contract agreement drawn up several months ago between the IIWA and the company is no longer valid and cannot be signed, according to an IIWA attorney. The union winning the election must negotiate a new contract.

New Refinery Due

. . . in Alberta by Canadian Oil. Work will start soon.

A 2,000-BBL. refinery and natural-gasoline plant are to be built 25 miles south of Red Deer, Alta., by Canadian Oil Companies, Ltd.

Construction of the $4-million facilities is to start in September, with completion scheduled in the fall of 1960. Canadian Bechtel, Ltd., has the engineering and construction contract.

The plant will handle 4,000 bbl. of condensate daily to be supplied by natural gas-processing plants in that area. It will produce 2,000 bbl. of gasoline daily in addition to diesel and a small amount of heating fuels. Most of the gasoline will go to the company's 260 White Rose service stations in Alberta.

The refinery will be capable of processing 2,000 bbl. of crude oil daily.

In addition to gasoline-blending equipment, facilities will include crude-fractionating, hydrodesulfurizing, and platforming units.

Canadian Oil also has a 50,000-bbl. refinery at Sarnia, Ont., which was placed on stream in September 1952.

Imports Fit Rise-Fall Pattern

. . . based on 6-month allocation period. This explains why July dropped to an average of 1,134,345 bbl. daily.

OIL imports in July dropped sharply below the June totals, demonstrating the rise-and-fall pattern that has developed under the mandatory controls program.

July imports (not including exempted imports from Canada) averaged 1,134,345 bbl. daily compared to 1,633,473 bbl. daily in June.

The reason for the wide variations from month to month is this: Imports reach a peak during the final month of a 6-month allocation period as companies attempt to fill their quotas (no carry-over from one period to another is permitted).

In the first month of the following allocation period, imports are slow because the companies have had little time in which to arrange shipping schedules. Thus, the figures for July—the first month of a new allocation period—fall well below the peak reached in June—the last month of the preceding period.

In July, crude oil and unfinished oil imports into Districts 1-4 averaged 637,674 bbl. daily. In June they were 940,213.

July crude oil and unfinished oil imports into District 5 were 189,900 bbl. daily, compared to 243,075 bbl. daily in June.

Imports of finished products into Districts 1-4 in July were: Residual, 253,730 bbl. daily; other products, 48,833 bbl. daily. In June they were: Residual, 320,866 bbl. daily; other products, 121,375 bbl. daily.

In District 5, finished product imports were 4,307 bbl. daily in July; 7,944 bbl. daily in June.

In July, exempted imports of crude and unfinished oil from Canada averaged 112,439 bbl. daily; in June, 93,776.

In Puerto Rico, imports of crude, unfinished oil, and products averaged 57,230 bbl. daily in July. In June, the average was 111,652 bbl. daily.

Over-all, imports in July fell 254,395 bbl. daily below the total permissible under the allocation plan. However, they have until the end of the allocation period, December 31, to make up the shortages if they wish.

New rules . . . Two changes have been made in oil-import regulations.

One affects the use of Canadian crude by U. S. refiners and the other applies to two situations in Puerto Rico.

Under the changes:

. . . U. S. refiners will no longer be permitted to include crude or unfinished oil imported overland from Canada in computing their refinery input. The reasoning is that since refinery inputs form the basis for import allocations, it would be unfair to include exempt Canadian crude in that base. This means that some refiners who use a large amount of such Canadian crude will wind up with lower allocations for imports from abroad.

. . . Increases of 2,098 bbl. daily of jet-fuel imports and 269 bbl. daily of asphalt imports have been granted for Puerto Rico. The jet fuel is for the Defense Department and the asphalt is for Shell Oil Co. of Puerto Rico.

Refiners Ask Boost

. . . in Alberta crude. U. S. demand up slightly.

REFINERS of Alberta crude are asking 385,367 bbl. of crude oil daily during September, up from the 355,300-bbl. August figure and a big jump from the 287,400 bbl. daily in September 1958.

This is short of the demand anticipated when it was announced last spring the U. S. would take increased quantities of western Canadian crude. Alberta wells can produce more than 800,000 bbl. daily.

Alberta refiners asked 61,675 bbl. daily, a decrease of 2,000 bbl. British Columbia refiners asked 73,707 bbl. daily, a 30,000-bbl. increase. A decrease of 7,000 bbl. to 46,850 bbl. daily was asked by Saskatchewan refiners. Manitoba boosted requests 13,000 bbl. to 15,335 bbl. and Ontario refineries decreased requests 14,000 bbl. to 124,200 bbl.

U. S. refineries and their requests include Shell Oil Co., Anacortes, Wash., 23,700 bbl.; Texaco Inc., at Anacortes, 8,000 bbl.; General Petroleum Corp., Ferndale, Wash., 24,000 bbl.; Bay Refining Co., Bay City, Mich., 3,500 bbl.; Lake Superior Refining Co., Superior, Wis., 4,000 bbl.; West Branch Refining Inc., West Branch, Mich., 300 bbl.

Imperial Oil Ltd. will take the largest amount of oil in September, asking 125,000 bbl. daily.

Richfield Fights Ruling

. . . by California commission declaring its gas operations make it a public utility and subject to state regulation.

RICHFIELD Oil Corp. has asked for a rehearing on a California Public Utilities Commission ruling declaring it a gas public utility.

The petition for the rehearing claimed Richfield wasn't doing anything any different from any other oil company in California in selling gas to a utility and crossing "public lands" with gas pipelines.

The Richfield petition further contended:

. . . **If the PUC** takes jurisdiction over Richfield's gas operations, as the ruling now indicates it will, then all other California producers doing similar business should be included in the ruling.

. . . **If use of public lands** for pipeline routes is grounds for declaring a company a public utility, then the pipeline operations of the gas distributing companies should also come under PUC control.

Failure to include the above conditions in any final ruling would be "intentional, discriminatory enforcement of a statute" the Richfield petition charged.

Old statute . . . The fly in the ointment was the apparent application by the PUC of an old statute on the state's public-utilities code which in effect declares that any company which supplies any commodity to a public utility which in turn passes all or part of it along to the public is itself a public utility.

This particular section, Section 216(C), hasn't been applied by a California Public Utilities Commission in more than 40 years. Richfield charged that the courts and previous commissions have said the rule couldn't be interpreted literally, as it apparently was in Richfield's case.

Actually, the PUC ruling doesn't spell out that rule 216(C) was the basis for the decision. But lawyers for both Richfield and the Southern Counties Gas Co. say it appears that 216(C) was the rule used.

What happened . . . In the meantime, the case which touched off the whole thing has been virtually lost in the shuffle.

It involved a Richfield contract with the Southern California Edison Co. where Richfield would supply the electric company with gas for use in an electric steam generation plant in Ventura County (OGJ, Aug. 17, p. 112).

When Richfield started building a 58-mile pipeline from its San Joaquin Valley operations to the steam plant on the coast, Southern Counties went to the PUC asking that this particular operation be declared subject to its jurisdiction.

The PUC agreed with Southern Counties, but went a lot farther in its ruling than even the gas company admits it wanted it to go. A gas company attorney said after the PUC decision was handed down that he didn't anticipate that Section 216(C) would figure in the ruling.

In its decision the PUC ruled that Richfield's gas operations should be subject to PUC control largely on two factors:

. . . **When Richfield** applied to the U. S. Bureau of Land Management, and the Forest Service, for permission to cross public lands with its pipeline to the Edison plant, it constituted a dedication of Richfield's gas facilities to public use.

. . . **Past practices** of Richfield in selling gas to Pacific Gas & Electric Co. and Pacific Lighting Gas Supply Co. also made it subject to PUC jurisdiction. It is this phase of the decision that makes it appear the disputed Section 216(C) was involved.

In speaking of the probable use of 216(C) in the ruling, Richfield's petition stated:

"This new and novel interpretation of the statute will cause hardship not only to the oil and gas industry, but also to the public utilities and the public.

"It should be remembered that not only gas, but coal, wood and oil are used to create electrical energy. If 216(C) is to be literally interpreted and applied, the commission must regulate many others besides producers of natural gas. It must regulate everyone who delivers a commodity which is thereafter furnished to the public.

"Insofar as natural gas is concerned, the probable result would be that producers, in order to avoid regulation by the public utilities commission, would divert their gas from sales to the gas companies for household use to the manufacture of chemicals," the petition concluded. cluded.

Further hearings on other phases of the PUC ruling are slated for September 25 in Los Angeles.

Survey Started Off Canada

MOBIL OIL Co. has started an aeromagnetic survey of a 600,000-acre tract centering on Sable Island, about 100 miles east of Halifax, Nova Scotia. Most of the area lies 10 to 60 ft. under water.

The survey, which will take 1 to 2 months to complete, is being made by Canadian Aero Service, Ltd., of Ottawa. Mobil Oil earlier this year took out an exploration license covering the area.

In other activity off Nova Scotia, Imperial Oil Ltd., has carried out aeromagnetic, gravity, and seismic surveys and geological studies and has drilled three wells on Prince Edward Island (OGJ, Aug. 17, p. 205). California Standard Co. has an exploration license covering about 100,000 acres on the western end of Prince Edward Island.

INDUSTRY BRIEFS . . .

Texas will remain on a 9-day producing schedule during September. Despite recommendations by Humble, Sun, and Texaco for increased output, the Texas Railroad Commission set maximum crude production for September at 2,730,215 bbl. daily. Eight major purchasing companies and spokesmen for independent producers had recommended the state remain on a 9-day producing schedule.

Louisiana has set its first bimonthly oil allowable at the August level, except for an increase of 8,199 bbl. for new production. The total for September and October will be 922,014 bbl. daily. Offshore production will rise to 200,558 bbl. daily up 1,784 bbl.

A September oil allowable of 320,000 bbl. daily has been set for Kansas by the Kansas Corporation Commission. That's an 8,000-bbl. increase over the July and August quotas. The increase was recommended by Jewell O. Ogden, conservation director.

The Navajo tribe has canceled a lease sale of 11,526 acres of land southeast of Shiprock, N. M. The land, scheduled for leasing September 15, is in San Juan County and offsets a

USING a new method developed by Esso, a mechanic at New York International Airport checks a sample of fuel from a jet airliner for moisture content. It means . . .

Quick Jet-Fuel Test Possible

A QUICKIE test is now available for running a final moisture check on jet fuels being delivered to airplanes.

A chemical is simply dropped into a spot sample of the fuel as it's being pumped to the plane. A color change will indicate water content as slight as 30 p.p.m.

The device was developed by Esso Export Corp. and Esso Research & Engineering Co., both affiliates of Standard Oil Co. (N. J.). It's called "Hydrokit" and has recently been field tested at several major international airports. It's now being delivered to Esso's world-wide network of aviation marketers and will soon be made available to others.

Water detectors now being used aren't too indicative when water content falls below 100 p.p.m. Many aircraft operators feel this is still too much moisture, so a simple test able to detect minute quantities in the 30 p.p.m. range was developed.

Eskimos Get Chance To Test Training on Far North Wildcat

ESKIMOS, trained several months ago as likely rig crew members when the oil search pushes farther into the frozen wastes of the Far North, may get the chance to show their stuff soon.

The Eskimos are expected to be on the rig floor for drilling of the first well in the Northwest Territories inside the Arctic Circle. It will be Canada's northernmost wildcat.

The wildcat will be drilled in the Grandview Hills area downstream from Fort Good Hope, 18 miles west of the Mackenzie River. The well, 1 Scurry - Rainbow Grandview Hills NWT, moves the search for oil and gas in Canada to its most northern point.

The location is 150 miles northwest of the Norman Wells field. It is 200 miles northeast of the Eagle Plains area of Yukon, scene of the recent oil and gas discovery by Western Minerals, Ltd. (OGJ, Aug. 24, p. 40).

The wildcat will be a basement test. It will core and test all porous zones. The Western Minerals well in Yukon produces from the Permo - Pennsylvanian at 4,250-4,415 ft.

Scurry-Rainbow, a Canadian independent, participated in the early land rush in the Far North. The company holds 67½% interest in 3,500,000 acres in the Lower Mackenzie River sector.

Peter Bawden Drilling, Ltd., of Calgary, will be drilling contractor on wildcat. Bawden has been conducting an on-the-job training program for Eskimos (OGJ, July 6, p. 162).

---

recent gas discovery with a high helium content. Paul Jones, Navajo tribal council chairman, said the tribe is withdrawing the land because it feels it "cannot afford to give away its resources." Jones cited a recent government contract that paid the producer 19 cents per M.c.f. for the helium-bearing gas. The tribe thinks the price is too low to justify the sale.

Continental Oil Co. will begin honoring Hilton Carte Blanche credit cards at Conoco service stations this week. Under the plan, an estimated one million holders of the cards can purchase Conoco products at some 8,000 stations in 27 states. Hilton card invoices will be processed through exclusive Conoco imprinters at service stations just as the company's own laminated plastic credit cards are handled.

Stanton Oil Co., San Antonio, has bought 15/16 of the working interest in the Bessie Whorton lease in Mead field, Jones County, Texas. It plans to water flood in the Gunsight formation. Principal sellers were Dalton Moore, J. C. Duff, and Paul Melton. The Stanton firm, organized last January, previously acquired seven semiproven leases of more than 1,000 acres in Scurry County.

The University of Texas has graduated its first woman petroleum engineer. Miss Jane E. Dean, 21, completed her degree requirements last week and will go to work in the office of her father, Paul C. Dean, Fort Worth independent. In the past, a number of girls have enrolled in petroleum engineering at Texas, but Miss Dean is the first to complete the work for a B.S. degree.

Stockholders of Bandini Petroleum approved the stock purchase of assets of Long Shot Oil Co. Involved in the deal is production in Foster and North Cowden fields in West Texas and the Rhodesa and Gretchen fields in East Texas, plus some acreage in Oklahoma. Production totals about 360 bbl. of oil daily and 746 M.c.f. of gas.

FINAL checkout is given a transceiver, which ties Magnolia Petroleum Co. into a national computer network.

Computer Hookup Saves Time

A NEW national "network" of electronic brains has been put into operation by the Socony Mobil organization.

The aim: Faster, cheaper answers to complicated scientific and engineering problems of all kinds encountered by Socony and its southwestern affiliate, Magnolia Petroleum Co.

The network links eight big electronic computers together via microwave systems and telephone lines and stretches all the way from the Gulf of Mexico to New York.

It will furnish quick answers to problems ranging all the way from determining the productive life of an oil field to figuring the best method of processing crude through a refinery.

Key element in setting up the computer network are new "transceivers." This equipment will convert data on punched cards to electrical impulses and transmit them instantly to any of the eight computers in the system.

The electrical impulses are received at the other end on punched cards which can then be fed into the proper computer. In many cases, answers to problems can be flashed back to the sender in a matter of minutes.

Before the new hookup was completed, transmission of punched-card information took many hours and in some cases required that the cards be mailed to other computer locations.

L. E. Frensley, Magnolia vice president, said the new network "will enable us to place problems on the exact style and size of computer best suited to solve them."

The complete network includes two computers at Magnolia's refinery in Beaumont, Tex., two in the Magnolia headquarters building in Dallas, one at the firm's field research lab at Dallas, two in the Socony building in New York City, and one at the Socony research and development center at Paulsboro, N. J.

This September, Frensley said, Magnolia will complete installation of an IBM 705, a computer larger than any now operated by the firm, in the Magnolia building at Dallas. It will be tied into the network to provide "even greater flexibility and speed."

PIPELINE BRIEFS . . .

A contract to internally clean and coat 24 miles of 6-in., 13 miles of 8-in., and 6 miles of 10-in. for Tennessee Gas Pipeline Co. has been awarded to Rosson Richards Construction Co. The project, located in Pennsylvania, will get under way this week.

An offshore gathering line will be laid by Sharman, Allen, Gay & Taylor, Inc., Houston, for Trunkline Gas. The job includes 5½ miles of 12-in. off Vermilion Parish, 6 miles of 12-in. off Cameron Parish, and 19½ miles of 14-in. in Vermilion Parish. The project is getting under way this week.

An abandoned coal mine west of Denver is being tested by Public Service Co. of Colorado for possible storage of 3 billion cubic feet of gas. Three wells have been drilled into the main mine cavern. Regular mine shafts would be sealed. If tests are successful, the Layden mine will store gas for peak consumer use periods next winter.

A $21 million compressor station construction program will be completed late this year by Transcontinental Gas Pipe Line Corp. Capacities of lines handling gas from Texas to eastern points will be increased from 1,108,000 M.c.f. to 1,249,000 M.c.f. daily.

Also for Pipeliners . . .

IN THE NEWS: Natural gas in only 3 years has elbowed its way into the fuel market in Pacific Northwest (p. 27) . . . Three firms aim legal attack at small-tract drilling in Texas (p. 28) . . . Richfield appeals California ruling that it is a public utility for gas operations (p. 32) . . . Crude line from Hassi Messaoud field completed (p. 49).

PLUS THIS TECHNICAL REPORT: Get top performance from turbine meters (p. 61).

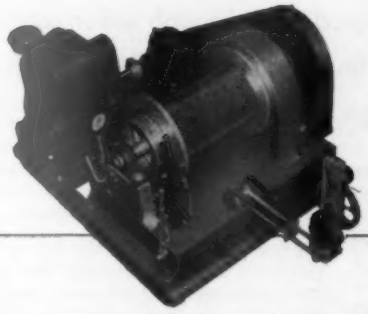
DETERMINES DOWNHOLE DEPTHS...

HALLIBURTON MEASURING DEVICES

Developed more than 35 years ago to provide accurate measurement for the correct placement of cement slurry, Halliburton Measuring Devices have undergone continuous improvement to insure unsurpassed accuracy in determining downhole depths. Today, this measuring line method, pioneered by Halliburton, is universally used to measure cement displacement during cementing of surface, intermediate and oil strings of casing. Guess work and possibility of miscalculation are virtually eliminated; exact depths may be read directly from the counter on the measuring device in feet or meters.

Because of its simplicity, effectiveness and extreme accuracy, the Halliburton Measuring Device is used by oil operators all over the free world for many applications apart from oil well cementing:

- *Accurate measurement of well depths.*
- *Running instruments for bottom hole temperatures and pressures, fluid samples, and the like.*
- *Running mechanically operated paraffin cutting tools.*
- *Running Halliburton Dump Bailer Limit Plugs or other types of tools in casing or open hole.*
- *Running shifting tools through tubing in changing chokes and seating nipples.*
- *Running crooked hole survey instruments.*

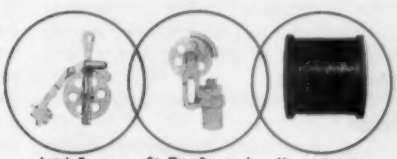


HALLIBURTON SUPER-DUTY POWER-DRIVEN MEASURING ASSEMBLY

Designed for wire line service work that requires large amounts of .066″, .072″, .082″ and .092″ diameter measuring line or for smaller amounts of 1/8″, 9/64″, 5/32″, 1/4″ or 5/16″ diameter cable. The super-duty reel, powered by an 8.25 hp Wisconsin AEN Engine as standard equipment, can perform severe oil field wire line and conductor work and is capable of taking heavy stresses and cable pull. This unit permits fast recovery of instruments from even the deepest of wells having a heavy mud system.

A special Halliburton Measuring Device calibrated for cables of 1/8″ to 5/16″ diameter or 9/64″ shooter line is available. Reel carrying capacity ranges from 18,700′ of 1/8″ cable to 3,000′ of 5/16″ diameter cable.

Halliburton Regular Duty, Heavy Duty, Extra Heavy Duty or Super-Duty Measuring Devices can be operated and driven by gasoline, diesel, electric or air power motors. Standard units are operated from rear wheel of car, or cathead operation. Halliburton Measuring Equipment is available for use in your well, regardless of depth. For more information, call or write for your free copy of the illustrated bulletin, "Halliburton Measuring Devices—Unsurpassed For Accuracy."



Latch Type Hay Pulley | Stuffing Box and Staff Assembly | Measuring Line

HALLIBURTON MEASURING EQUIPMENT

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

"A Measure Of Accuracy—For All Downhole Requirements"

Conservation Forum's Spacing Campaign

- Since its birth a year ago, forum has helped push through wider-spacing laws or regulations in several states. Primary aim of organization is to "make money by saving money" through drilling fewer wells.

Robert J. Enright
Dallas District Editor

NEXT MONTH the Oil Industry Conservation Forum will observe its first birthday. How has it fared and what has it accomplished in its first year of war on high petroleum production costs in the United States?

Late last month the steering committee of the forum, chairmaned by Jake L. Hamon, Dallas independent operator, met in Dallas to take a good look at what it had done and what it needed to do.

It was generally pleased with the result.

The scoreboard lists several major gains in key producing states in forwarding the forum's prime objective —wider well spacing.

Biggest single achievement probably was the enactment of a new law in Oklahoma authorizing the Oklahoma Corporation Commission to widen spacing for average-to-deep wells. Notable spacing advances, either legislative or through dictum of state regulatory bodies, however, also were scored in Arizona, Texas, Nebraska, Mississippi, Kansas, and other states. And prospects are bright that drives in still other states will produce wider-spacing dividends there in the next 2 years.

Forum, a catalyst . . . Such progress coming so swiftly, if due solely to the formation and activities of the forum, would be nothing short of miraculous.

The truth is, however, that work toward wider spacing in many states has been under way for months and even years by individual operators and oil associations cooperating with state regulatory bodies. Some of this year's spacing advances were essentially in the bag by the time the forum was organized.

The forum actually has been the result rather than the cause of a grass-roots movement over the U. S. oil patch generally toward wider spacing and more efficient operation. And forum members readily admit it.

Hamon, for instance, pictures the forum as a "catalyst and vehicle which we hope can speed a movement already under way and perhaps help smooth its path."

Nevertheless, the yearling organization's work during its first months of operation has been impressive.

Big job ahead . . . For the forum has tackled a very big job—one that calls for a tremendous educational program. In working toward its ends, it is dealing with laws and mental attitudes, neither of which can normally be changed overnight.

In many cases, the forum will have to change the mental attitudes—sometimes more those of landowners, chambers of commerce, and the like than of operators—before it can hope to make real progress toward changing objectional spacing laws and regulations.

A top industry topic . . . Along with its concrete gains, the forum during the past year has made less tangible but quite definite progress in the educational field by furnishing speakers wherever program spots are open. Principally, they've addressed local or regional oil groups but civic groups and national oil meetings also have been targets.

This work has been spectacularly

In the photo

Chairman Jake L. Hamon, right foreground, directs the meeting. Others attending are, clockwise from Hamon, Robert Andrews, Magnolia, Dallas; Harold Decker, Highland Oil Co., Houston, head of Texas subcommittee; E. B. Miller, Jr., Tidewater, chairman of general committee; A. E. Chester, Magnolia, chairman of La.-Ark.-Miss.-Ala. subcommittee; A. E. Collins, Vickers Petroleum, Wichita (substituting for Jack Vickers); Frank P. Zoch, Corpus Christi independent, Turnbull & Zoch; Fred Shields, San Antonio independent; Hamilton Rogers, Texas Pacific Coal & Oil, Fort Worth; Alden Donnelly, Honolulu Oil Corp., San Francisco; Cecil Hamilton, Phillips, Bartlesville (substituting for L. E. Fitzjarrald, chairman of the Oklahoma-Kansas subcommittee), Curtis Condra, Pan American, Fort Worth (substituting for C. F. Bedford); Bouwe Dykstra, Shell, New Orleans; Joseph I. O'Neill, Midland independent; R. E. Foss, Sunray Mid-Continent, Tulsa; James E. Low, Amerada, Tulsa, chairman of Arizona-New Mexico subcommittee; Herbert W. Hunt, Hunt Oil, Dallas, chairman of Rocky Mountain subcommittee. Carl Reistle, Jr., Humble, Houston, attended the meeting, but was not present when this photo was taken.

Is Paying Off

effective in presenting the forum's wider-spacing objective and getting it talked about by large and small producers alike.

Current talk is both for and against the forum position. But a forum for open debate and opinion swapping has been created.

In Texas, for instance, the West Central Texas Oil and Gas Association has named a committee to study the feasibility of wider spacing in the West Central Texas area. The committee is to report on its study and make recommendations at the association's annual meeting in Abilene November 19.

The North Texas Oil and Gas Association has taken similar action. And an investigating committee is due to report to the membership soon.

The forum does not intend to let this flame of interest die out. This fall it will hold a national meeting, probably either in Dallas or Houston, on the wide-spacing question.

It will be an open meeting with all segments of the industry invited to exchange views on spacing problems.

The forum feels that it has won half of its battle if it can keep the spacing question in the limelight—talked about, argued pro and con. Its members are convinced they speak economic sense.

As Hamon put it recently in a talk to Texas independents: "There are no bugs under the rug. Our program is open and aboveboard. There is nothing more or less to wider spacing than the profit motive. If we can get the royalty owner the same amount of oil by wider spacing that we can by busting ourselves by drilling useless wells, we are not hurting him and we are helping ourselves.

"Sure you can save a little money here and there by dual completions, lighter pipe, slimmer holes—but the biggest saving is in not drilling two wells where one would do the job.

"I am trying to work on this program in order to make all of us make money by saving money. If we don't do it, we are sunk. And historians may ascribe our going out of business as an example of an industry's inability to adjust itself to competitive conditions.

"Every time we waste money, we put ourselves in a poorer competitive position to compete in the world oil market and keep afloat in a sea of inflation."

A batch of forums . . . The conservation forum is not a rigidly regimented group. It is rather a large but loosely knit group of oil men with the same general desire to cut down per barrel costs of producing domestic crude oil.

Spacing and conservation laws vary widely from state to state. So do the attitudes toward conservation of producers, royalty owners, government officials, and others.

This demands a local approach to the conservation problems in each area. The forum has wisely recognized this by setting up five regional and autonomous subcommittees. Each is made up of oil men who are veteran operators in their respective areas, thoroughly grounded in its conservation laws and regulations. Most of them are independents. The forum recognizes that the subcommittee is the best judge of what is lacking or needs correcting in its area and what the chances of success might be of various methods of attack. Decisions as to what action should be taken, when and how, are entirely up to the subcommittee.

The subcommittees are quite free to cooperate with oil associations, companies, state conservation agencies or anyone else in working toward their goals. They've already done so in many cases.

In some regions, the subcommittee in turn is made up of subgroups for the individual states. Where this is so, these state committees, too, are autonomous.

In effect, rather than one forum, there is a batch of them.

The steering and general committees serve as vehicles where subcommittee chairman assemble and swap ideas, also as a national voice to forward general forum aims.

Here, briefly, is a state-by-state rundown of wide-spacing gains during the year and the conservation situations in states where the forum is currently active.

1. Oklahoma

One of the industry's most painful well-spacing problems was cleared up this year in Oklahoma through efforts of the forum working in concert with the Mid-Continent Oil and Gas Association, the Oklahoma Corporation Commission, the Oklahoma Independent Petroleum Association, and units of industry.

The weight of this effort proved sufficient to push a new spacing law through the Oklahoma legislature. The bill, as initiated, would have removed all restrictions on spacing as to depth.

Compromise proved necessary, however, to win support or at least avoid outright opposition of the state's potent stripper-well operators. And the bill, as enacted, placed depth restrictions on compulsory minimum spacing.

Though not the ultimate, the law is felt by the forum subcommittee to be entirely "adequate" and to represent a major breakthrough in a state where wider spacing was badly needed.

The old law limited well spacing units for oil wells to 40 acres to a depth of 9,990 ft. The new one limits spacing units for oil to 40 acres down to 5,000 ft. and to 80 acres between 5,000 and 9,990 ft. Below 9,990 ft. there is no restriction on the size of the spacing unit.

Operators feel it would be a rare occasion where a producer would request spacing units larger than 40 acres at depths above 5,000 ft.

The new spacing rules apply to forced integration of interests.

On top of this, the commission has the authority under the law to permit larger voluntary spacing units regardless of depth.

It also has the express right under the law to take acreage into account in the fixing of allowables.

This is considered by the forum to be a necessary companion to wider spacing. In order to be truly effective in cutting down unnecessary wells, an oil well completed on 80 or 160 acres should be granted an allowable proportionately larger than one completed on 40 acres under the same conditions. The allowable provides the needed incentive.

All provisions in the new law affect oil. The Oklahoma commission al-

DISCUSSING progress made by the Conservation Forum are E. B. Miller, Jr., left, of Houston, chairman of the general committee and a Tidewater Oil Co. vice president, and Jake L. Hamon, right, Dallas independent and forum chairman.

ready had authority to set wider spacing for gas wells.

2. Texas

No legislative action has been undertaken in Texas in that the Texas Railroad Commission already has legal authority to set spacing as wide as it sees fit.

Texas laws fix only minimum spacing, now at 20 acres state wide. An exception to this is the state's controversial Rule 37. This, in effect, states that an operator is entitled to drill a well on his lease, no matter how small it may be, if the land were subdivided prior to discovery of oil or gas.

Spacing on 40 acres for oil is the general rule, though 20 acres is still approved in areas with small, shallow pools as in North Central Texas and the Panhandle.

Gas spacing ranges from 160 to 640 acres.

Spacing gains made . . . There have been definite gains toward wider spacing in Texas this year. A growing number of oil fields are being developed on 80 acres. And, in fields where there was no opposition to such requests, the commission in precedent-setting actions approved 160-acre spacing.

Also for the first time, the Texas agency approved allocation of oil allowables via formulas based 100% on acreage. These decisions, too, were made on request of operators in fields where the requests were not opposed.

What is planned . . . The Texas subcommittee, headed by Harold Decker, Houston, is known to favor some revision of the current 1947 oil-allowable yardstick (based on depth) to provide more incentive for wider spacing.

The 1947 yardstick does not geometrically reflect wider spacing. And subcommittee members feel that some move in this direction is necessary before operators will be encouraged to go to wider spacing in great numbers.

Likewise, the Texas group leans toward temporary spacing rules for new fields which would be adopted following completion of the discovery well as is the case in North Dakota.

This would prevent operators from being trapped into narrow spacing throughout the development of an entire field by what is often too-narrow spacing of the first few wells drilled. Rules for a field, including spacing, are not now established in Texas until after the fifth well has been completed.

Following completion of the fifth well, the temporary spacing rule would be subject to review on request by any operator in the field.

The lack of any such rule now or of more general wide spacing in Texas appears to be due not to any fault of the commission but to the absence in the past of any general industry support or effort for such.

The Texas agency traditionally has responded quickly to accept any sound proposal with wide industry support which would tend to make production more efficient and eliminate wasteful practices.

The Texas subcommittee of the forum recognizes the previous lack of any industry effort in this direction. In fact, Decker says, a quick check back will show that essentially all conservation advances in Texas have been made with the leadership of the commission rather than that of the industry.

Prime aim of the subcommittee is to energize the industry and at last stir up some long-due concerted industry action.

The committee definitely will not recommend any change in Rule 37. And its members are opposed to any legislation providing for compulsory unitization.

3. Louisiana

No progress has as yet been made in Louisiana. But some members of the regional subcommittee in that area feel there is work for the forum there.

The present allocation system is based entirely on depth, with no consideration for acreage. This acts as a wet blanket on wide spacing.

The committee is at work on this problem.

4. Mississippi

Wider spacing is expected to advance in Mississippi despite an apparent setback for the forum and other wider-spacing advocates there.

Rules 7 and 8 of the conservation regulations in Mississippi provide for drilling units of 40 acres for oil and 320 acres for gas.

Even before the forum was formed, an industry group in Mississippi was engaged in efforts to bring about wider spacing for wells at depths below 10,000 ft.—specifically it sought 80 acres for oil and 640 acres for gas below this depth.

The Mississippi Oil and Gas Board called a public hearing on the industry proposal and on the advisability of amending the rules accordingly. The change was opposed by a number of chambers of commerce, boards of supervisors, and municipalities. And the board subsequently decided not to amend the rules.

It issued a significant statement, however, that it is willing to consider wide spacing on an individual field basis at special field rules hearings. These would be held "after a few wells have been drilled to supply the information needed concerning the reservoir behavior."

It is not felt likely that the forum subcommittee, after studying the situation, will act in Mississippi in the near future.

5. Arizona

Arizona's recently created Oil and Gas Commission just this month

When you hang Liners

USE BAASH-ROSS LINER HANGERS...

Types are available for every well condition!

Baash-Ross Liner Hangers — including plain type, regular action packing type, delayed action packing type, and Liner Hangers with hold-down slips, as well as setting tools and cementing manifolds — meet every requirement for safety in positive setting and, when necessary, effective cementing jobs.

Write for the new Baash-Ross technical manual on Liner Hangers which gives full information on all Baash-Ross Liner Hanger equipment and liner hanging techniques.

BAASH-ROSS DIVISION
OF JOY MANUFACTURING COMPANY
GENERAL OFFICES: 5306 CLINTON DRIVE, HOUSTON, TEXAS

AREA OFFICES:
Houston, Texas, Odessa, Texas, Dallas Texas; Long Beach, Cal.; Casper, Wyoming; Oklahoma City, Okla.; Olney, Ill.; Calgary, Alberta, Canada; New York, N. Y.

FOREIGN OFFICES:
Monte Carlo, Monaco; Mexico City, Mexico; Greenock, Scotland; London, England; Paris, France; Caracas, Venezuela; Buenos Aires, Argentina; Rio de Janeiro, Brazil; Tokyo, Japan

BAASH ROSS JOY

named Don Jerome, former exploration superintendent for Sinclair Oil & Gas Co. at Fort Worth, as its executive secretary.

The commission will administer, under a state conservation law passed earlier this year, the most liberal spacing rules in the West. The new Arizona law is one of the year's brightest accomplishments from the wide-spacing point of view.

It leaves little to be desired, the forum subcommittee feels. And no further action is planned in that state in the foreseeable future.

Basic spacing patterns are 80 acres for oil and 640 acres for gas. The law also provides for market-demand proration.

6. Kansas

Solid progress was chalked up in Kansas at the last session of the legislature with the enactment of a bill giving the Kansas Corporation Commission the authority to adjust allowables on the basis of acreage.

Credit for its passage goes mainly to hard, steady effort over several years by a majority of Kansas operators working with the Kansas commission.

The new law will help materially, Kansas subcommittee members feel, pending the passage of express wide-spacing legislation. Such legislation is certain to be pushed by the forum at the next session of the legislature in the spring of 1961.

It will propose a broad spacing law, and probably vest authority in the commission to integrate interests within spacing units.

Some subcommittee members feel a pool-wide unitization law for secondary-recovery purposes also is badly needed in Kansas. But it is unlikely that any effort will be made in 1961 to obtain it for fear of getting the spacing bill entangled in a unitization controversy.

7. Alabama, Arkansas

The subcommittee feels there are no problems in these two states with which it could deal effectively at present.

8. New Mexico

The New Mexico Oil Conservation Commission has wide authority under state law and may approve wide spacing if it sees fit.

The commission already has approved 80-acre spacing in a number of deeper oil pools—and in one instance, Bisti field, at a depth of only 5,000 ft. Gas-well spacing presently is based on 160 acres and the basic oil pattern is 40 acres.

Many operators feel that wider spacing for gas wells and for oil wells more generally is needed—also that allowables for wide-spaced wells should be increased.

A proposal considered would call for deeper discovery wells to be spaced on 80 acres for a 1-year test period and granted an allowable double that of a 40-acre-spaced well.

A hearing would be held at the end of the year at which engineering data would be considered by the commission and permanent spacing set.

A tentative gas proposal would have shallow gas wells spaced on 320 acres and deep wells on 640 acres, with the breakover point occuring at around 8,000 ft.

The proposal would not affect existing fields.

9. The Rockies

The Rocky Mountain area subcommittee of the forum, concentrating on wide spacing, has found few spots where spacing problems are great.

It, therefore, likely will be less aggressive than those in other areas.

Colorado . . . Operators feel generally that Colorado is about the only Rocky Mountain state with real spacing problems. They think that 10 and 20-acre spacing patterns are too easy to come by in the Denver-Julesberg basin under the present regulatory setup. And they hope to obtain oil-well spacing based on 40 acres and wider.

The trend has been in this direction.

Operators feel that Colorado is not yet ready for pool-wide unitization but that an educational campaign to prepare for this day likely should be started.

Montana . . . There are believed to be no specific plans as yet. But operators generally think that the regulatory commission there should be granted more latitude in determining spacing.

North Dakota . . . North Dakota conservation laws are patterned after the model form advocated by the Interstate Oil Compact Commission, with the omission of compulsory unitization.

Oil spacing on 80 to 160 acres is the basic pattern. The majority of new fields are being approved for 160-acre spacing after experiments with temporary 160-acre rules in some fields resulted in stimulated exploration.

Though some operators feel that a compulsory-unitization law is desirable, they don't consider it absolutely necessary. This feeling is due to recent commission action approving two large pressure-maintenance units, each taking in more than 15,000 acres.

South Dakota . . . South Dakota now has a spacing law which permits drilling oil wells on a minimum of 10 acres. However, it is possible to obtain wide spacing under present regulations. And the State Oil and Gas Board recently issued a 160-acre spacing order for Buffalo oil field in Harding County.

Operator feeling generally is that the minimum spacing figure should be hiked to 40 acres for shallow and 80 acres for deep wells.

An effort was made to pass improved legislation at the last session of the legislature. It failed, even though supported by the state geologist, because of a lack of genuine industry interest.

It is probable that another attempt will be made at the next session which will get much stronger industry support.

Utah . . . Utah conservation regulations provide that the commission set spacing so as to prevent waste of oil or gas, to avoid drilling of unnecessary wells, and to protect correlative rights.

Regulations generally are felt adequate, but broad and vague and with too much perhaps left to the discretion of the commission.

Legislation may be introduced in 1961.

Wyoming . . . Wide spacing is already possible under present Wyoming regulations. Many operators feel there is a real need, however, for initiation of secondary-recovery projects and that unitization deserves further attention.

Legislative action is possible in 1961.

Nebraska . . . No action is contemplated in the near future in Nebraska. The state this year passed an oil and gas conservation act which was the product of almost 5 years constant effort by operators and legislators.

In general, it follows the model form of the Compact. It does not provide for market-demand proration. But it does include strong provisions to protect correlative rights and prohibit the drilling of unnecessary wells. There is also a ratable-take provision.

Pending the time the Nebraska Oil and Gas Conservation Commission, appointed by the governor, adopts rules and regulations, and operators see how they fare under them, they plan no further action.

Oil to Be Top Energy Source for 50 Years

- MIT official tells Houston symposium real competition from nuclear power is at least 30 years away.

DESPITE the development of new energy sources, the petroleum industry will be providing the "great bulk" of the world's expanded energy needs for the next half century. And it will be a major factor for another half century after that.

This long-range appraisal of oil's future was presented last week in Houston at a symposium of oil and educational leaders marking the industry's centennial.

Walter G. Whitman, chairman of the chemical-engineering department at Massachusetts Institute of Technology, keynoted the symposium. The theme: "The Next One Hundred Years."

Whitman brushed aside the fears of pessimists that the supplies of oil and gas will be insufficient to meet demand in the decades ahead.

Whitman also saw no real competition for the oil industry in the U. S. from nuclear power for at least 30 years.

"The prospects for commercial nuclear power have been hotly debated for the past decade," Whitman said. "There is no question but what we could soon have large amounts of power from nuclear fission reactors in the United States if we needed it . . .

"The only block—and it is a compelling one—is the heavy investment in facilities, which is only partially offset by the savings in fuel. Plentiful supplies of fossil fuels allow power to be produced in this country more cheaply by conventional means than from nuclear reactors as we now know them.

"I doubt that nuclear reactors will assume a significant role in the U. S. power production within the next 30 years. The time scale will be shorter, however, in industrialized nations which must rely heavily on imported fuels."

Solar energy . . . Whitman took somewhat the same view on development of solar energy as a competitor of fossil fuels.

Solar power is promising for small units which can generate power at the point of need, but for large units for central power generation, the investment will be too great for the next 3 or 4 decades.

Whitman's conclusion: "Based on the record, I think we may fairly conclude that oil and natural gas will still be supporting the great bulk of the world's expanded energy needs 50 years from now. I would venture that they will be major factors after yet another half century."

Conoco Plans Straight-Chain Alcohol Plant

CONTINENTAL Oil Co. will start construction immediately on a multi-million-dollar petrochemical plant at Lake Charles, La., to produce straight-chain primary alcohols.

Building of the plant means that straight-chain alcohols will be made from petroleum base for the first time. Presently they depend on natural sources such as coconut oil and tallow fat.

The plant will have a capacity of 50,000 lb. annually. Lummus Co., Houston, has the construction contract and will complete the job by early 1961.

Continental selected the St. Charles site because it is near the Petroleum Chemicals, Inc., ethylene plant, which will provide the primary raw material. Conoco is a 50% owner of PCI.

The new process of making the higher molecular weight straight-chain alcohols from petroleum was announced a year ago by Conoco. The company's research scientists and engineers developed the process during a 5-year period at Ponca City. The process is based on earlier work done by German scientist Karl Zeigler, and Conoco is licensed under the Ziegler patents.

The basic intermediate produced is aluminum triethyl, a pyrophoric material also used in jet propulsion.

Conoco will market the series of alcohols under its "Alfol" trademark for use in manufacturing detergents, plasticizers, cosmetics, lubricating oil additives, paper, textiles, and emulsifiers.

Straight-chain alcohols have valuable properties well known to the industry. For example, phthalate esters of straight-chain alcohols have better low temperature and permanence characteristics when used as vinyl plasticizers. Also sulfates of straight-chain alcohols are used in synthetic detergent formulations.

"Introduction of these new products made from petroleum-derived raw materials means that in the future these important chemicals will be available from a stable and economical source," Harold G. Osborn, Conoco's senior vice president, said.

Gulf Drills 15,475-Ft. Dry Hole Off Florida Keys

THE OIL industry has gambled again on Florida—and lost. But the dice are ready to roll again.

Gulf Oil Corp. confirmed last week that it has plugged and abandoned an expensive 15,475-ft. test near the Marquesas Keys west of Key West.

The offshore wildcat, drilled by the Kerr-McGee Oil Industries' Rig 28, failed to produce any commercial shows. It had been a tight hole since spudding last February.

Gulf and The California Co., in the meantime, acquired 22 additional tracts west of the dry hole from the federal Government at a bargain average price of $12.92 per acre (OGJ, June 1, p. 100). The two companies have announced no drilling plans.

However, Calco has entered into another offshore Florida deal to the north and will spud shortly (OGJ, Aug. 24, p. 43). The drilling site is off Franklin County on a lease held by Coastal Petroleum Co., a subsidiary of Coastal Caribbean Oil, Inc.

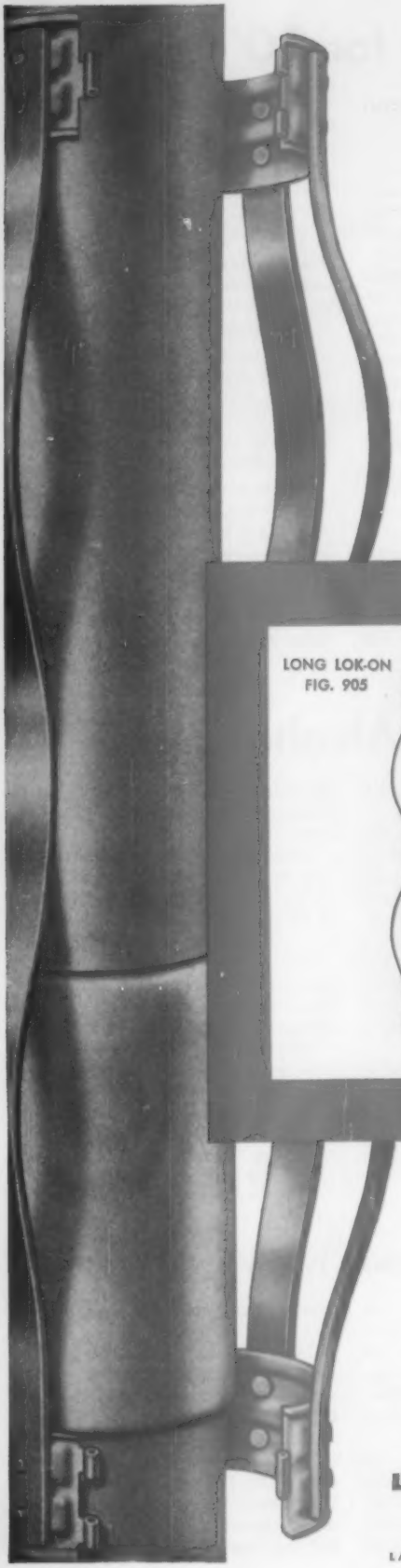
The well will be located on a 10,000-acre block, which is part of 4 million acres of leases held by Coastal. Calco will pay the full cost of drilling and earn a 50% interest in the block.

A number of oil companies, including majors, have tried perhaps a dozen times to find oil off Florida, but the first strike is yet to be made.

LARKIN CASING CENTRALIZERS

EXCEED ALL KNOWN REQUIREMENTS

Based on established standards, Larkin Casing Centralizers take 45% less permanent set than maximum . . . exert 300% more initial centering force than minimum required. There's a size and range for every condition.



LONG LOK-ON
FIG. 905

LONG SLIP-ON
FIG. 903

SHORT LOK-ON
FIG. 904

SHORT SLIP-ON
FIG. 902

LARKIN
...Through Your Supply Store

PESA

LARKIN PACKER COMPANY, INC.

WAXAHACHIE, TEXAS

LARKIN LEADERSHIP HAS BEEN EARNED BY YEARS OF DEPENDABLE PERFORMANCE

Acetic Acid Plant Becomes Country's Largest

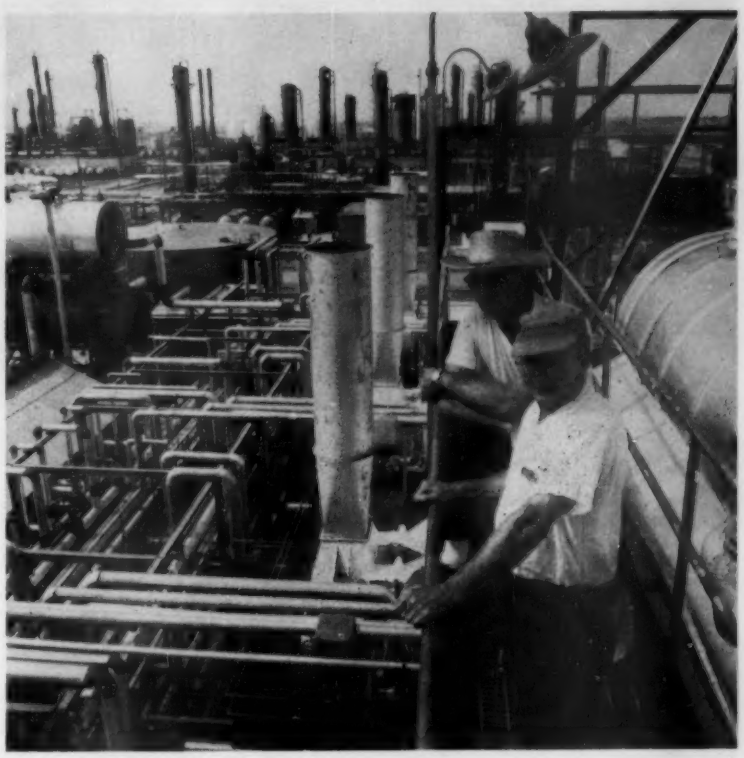
CELANESE Corp. of America has completed an expansion program at its Pampa, Tex., petrochemical center, which makes its acetic acid installation the largest in the country.

In nearly doubling existing capacity, Celanese is now able to produce 240 million pounds per year of the two basic acetyl chemicals, acetic acid and acetaldehyde, at the Texas Panhandle plant.

A company-developed process is used to produce the acid, which consists of partially oxidizing hydrocarbons under high pressure, followed by a complex series of purification steps. The method was developed at its research laboratories at Clarkwood, Tex., an outskirt of Corpus Christi.

Construction began last December. Brown & Root, Inc., did the work.

Acetic acid is used as a raw material in the manufacture of fibers, coatings, insecticides, and the fast-growing polyurethane foamed plastics. Its prime use is in the manufacture of cellulose acetate. Last year about 546 million pounds of synthetic acetic acid was produced in the U. S. An additional 20 million came from natural sources.



PROCESSING BRIEFS . . .

A unit to manufacture 20,000,000 lb. of maleic anhydride annually will be built at Standard of California's Richmond, Calif., refinery by California Chemical Co., a subsidiary. It will be completed in mid-1960. Maleic anhydride is used in production of plastics for boats, auto bodies, household appliances, paints, and agricultural chemicals. The output will be marketed by Oronite Chemical, a California Chemical affiliate.

Hourly employes of DX Sunray's Duncan, Okla., refinery can choose between two unions—or vote for no union representation—at an election set by the NLRB for September 29. Unions on the ballot will be the International Union of Operating Engineers, Local No. 670, AFL-CIO, and the Process and Control Engineers. The Operating Engineers have represented the employes since 1952.

Commercial and product-development plants for manufacture of high impact and conventional polystyrene will be built at Joliet, Ill., by Amoco Chemicals. The commercial plant is scheduled for completion by the third quarter of 1961, and the development facilities will be in operation by the second quarter of 1960.

Derby Refining's $1,400,000 alkylation unit at its Wichita refinery has been placed on stream. It uses the Universal Oil Products processes and has capacity of 1,700 bbl. daily.

A $1.5-million expansion of the catalytic-cracking unit at British American's Clarkson, Ont., refinery has boosted capacity from 12,000 to 18,000 bbl. daily. The crude-running capacity of 61,500 bbl. daily was not increased.

A 7,500-bbl. Unifining unit is on stream at Commonwealth Oil & Refining's Ponce, Puerto Rico, refinery. The unit was designed and licensed by Universal Oil Products and built by Procon International. Procon also is revamping other facilities at the plant.

Delhi-Taylor has purchased Southern Oil Co. of Fort Lauderdale, Fla., which owns 60 service stations in southern Florida. Southern will operate as a Delhi subsidiary.

Also for Refiners . . .

IN THE NEWS: Amoco management threatens to start hiring nonunion workers at Texas City refinery if OCAW workers don't return (p. 30) . . . Canadian Oil plans new refinery in Alberta (p. 31) . . . Imports fit rise-and-fall pattern by drop in July (p. 31) . . . Demand for Alberta crude by U. S. refiners shows rise (p. 31) . . . Celanese completes expansion program at Pampa petrochemical center (p. 43).

PLUS THESE TECHNICAL REPORTS: Steam power cycle utilizes gas turbine at Carbide (p. 77) . . . Atlantic's new $10-million wax plant (p. 83).

PHOTOS IN THE **NEWS**

Designed for Fast Service

Continental Oil is experimenting with a service station in Houston aimed at the motorist in a hurry.

The station offers all the immediate needs of a car owner—gasolines, motor oils, and related products. Missing are the service bays for grease and wash jobs, repair work, and similar services. Although no tires are sold, the station does market batteries and small accessories.

The station, first of two planned in Houston, has four widely spaced pump islands. The sales office is located at the island nearest the street. At the rear is a roofed semi-circular walkway lined with storage rooms, a display case, vending machines, and rest rooms.

Conoco's theory behind the new-style station is that in some areas where people are "on the go," such as in an apartment development, the motorists want quick service. They have time-consuming services done while at the office.

Quick Coating

A new deepwater terminal will cut transportation and handling costs at the Syd E. Culbertson Co., Inc., pipe-coating and wrapping plant in Houston. Pipe may be unloaded directly into the plant, coated in a short time, then returned to the same barges for shipment to the job site.

'Python' in Action

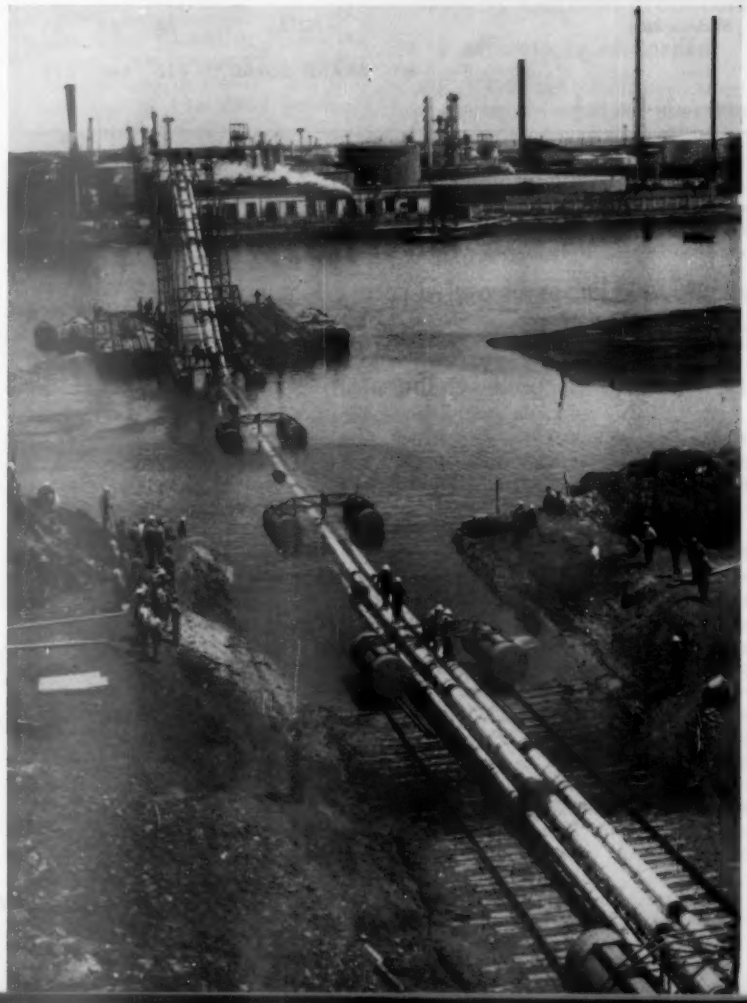
A British company, Steel Barrel Co., Ltd., of Uxbridge, has developed a high-speed hydraulic refueler it calls the "Python." It was introduced to meet the demands of today's high fuel-capacity planes.

The refueler has a pumping rate of 1,000 g.p.m. It can refuel a Viscount in less than 2 minutes, a Comet in less than 8, and a Boeing 707 in 12 minutes. The refueler uses high-speed hydraulic motors for driving pumps and hose reels. The master pump is driven by a tractor engine, a Rolls Royce B-60 diesel rated at 250 hp.

It Works Like This

Mel Blanc, famed Hollywood voice manipulator, is boosting El Paso Natural Gas Products' new multigrade gasoline program. Blanc is pointing to a card which indicates which one of El Paso's seven different grades of gasolines is best for the various models of cars.

El Paso has converted about 30 stations to the multigrade system and plans to expand the pumps throughout its marketing territory within 6 months (OGJ, Aug. 24, p. 38). El Paso custom blends six grades at the pumps and sells its Dixie regular at a separate pump. Octane ratings will range from about 89 or 90 for Dixie regular to over 100 for the top custom-blended gasoline.



Altogether, Pull!

A 12-in. crude line and five auxiliary lines or cables were laid simultaneously across a canal near Venice recently by British Petroleum and AGIP, the Italian Government's oil company.

Making the 250-yard crossing with the crude line were an insulated 6-in. steam line run in 16-in. pipe, an 8-in. water line, a 3,000-volt cable, a telephone cable, and a pilot cable. The lines and cables were run from a new tank farm on the Isola dei Petroli to the 35,000-bbl. Porto Marghera refinery owned by BP and AGIP.

Time was important since authorities permitted the companies to keep the busy canal closed only 24 hours. But the companies had time to spare. They bound the cables and lines together on a 330-yard runway and pulled them across in one trip. They were laid in a concrete channel, then covered with an 8-ft. layer of stones and earth. The operation was completed in 15 hours.

Where Rigs Are Running Abroad

	Aug. 1959	April 1959	Dec. 1958
Latin America			
Argentina	88	73	68
Bahamas	..	1	1
Bolivia	11	12	16
Brazil	24	35	30
British Honduras	1	1	1
Colombia	28	26	22
Chile	5	5	4
Cuba	1	2	3
Ecuador	6	4	3
Guatemala	3	1	1
Mexico	120	120	110
Panama	..	..	1
Paraguay	1	1	1
Peru	4	13	13
Trinidad	31	33	33
Venezuela	61	78	85
TOTAL	384	405	392
Western Europe			
Austria	19	19	19
Denmark	..	1	1
France	57	58	50
West Germany	127	130	140
Italy	36	36	36
Malta	..	1	1
Netherlands	3	3	3
Portugal	1	1	1
Spain	3	3	3
United Kingdom	5	2	4
TOTAL	251	254	258
Africa			
Algeria	40	41	38
Angola	2	2	2
British Somaliland	1	1	1
Egypt	5	5	5
French Equatorial Africa	11	11	10
French West Africa	2	2	3
Libya	15	8	8
Madagascar	3	1	3
Morocco	5	4	2
Nigeria	8	7	6
Somalia	2	2	2
Tanganyika	1	..	1
Tunisia	3	1	2
TOTAL	98	85	83
Middle East			
Iran	10	10	8
Iraq	8	8	8
Israel	4	4	6
Jordan	1	1	1
Kuwait	2	7	6
Neutral Zone	4	4	2
Qatar	1	1	1
Saudi Arabia	6	3	3
Southern Arabia	3	3	3
Syria	2	2	2
Turkey	5	5	3
TOTAL	46	48	43
Asia-Pacific			
Australia	4	4	4
British Borneo	2	2	2
Burma	3	3	3
India	5	5	5
Indonesia (incl. Timor)	16	16	16
Japan	15	15	15
New Guinea (incl. Papua)	1	1	1
New Zealand	1	1	..
Pakistan	6	6	6
Philippines	1	1	1
TOTAL	54	54	53
GRAND TOTAL	**833**	**846**	**829**

NOTE: Estimates are made where complete up-to-date reports are lacking.

Foreign Drilling Activity Drops

● Journal survey shows number of active rotary rigs is down 13 from the April total. But 833 is still a near-record level. Big slump in Venezuela offset increases elsewhere to account for the slight decline.

ROTARY drilling has declined slightly in the Free World outside the U. S. and Canada, with 833 rigs now making hole.

This is 13 fewer rigs on wildcat and development wells than were active in April. But a Journal survey shows drilling is still at a near-record level, with more rigs busy than at the end of last year. The figures do not include workover or service wells.

The foreign decline comes at a time when more rotaries are working in the U. S. and Canada. In mid-August there were 2,146 rotaries making hole in the U. S., 89 more than in mid-April. Canadian operators had 115 rigs active in mid-August, 34 more than 4 months earlier.

Venezuelan slump . . . Depressed drilling activity in Venezuela is the chief cause of the over-all decline in the foreign drilling level.

Companies have pulled in their horns on drilling budgets in the months since the new income tax law went into effect and the government announced that crude production eventually will be limited.

There were only 61 rigs active the second week of August. This is less than half of the record 123 rotaries that were making hole in the fall of 1957.

Thirty-two of the rigs operating this month are in Western Venezuela, and 29 are in Eastern Venezuela. Sixteen are on wildcats, 15 on semi-exploratory wells, and 30 on development.

Straws in the wind indicate the Venezuelan drilling slump may be permanent. There was a record total of 54 seismic, geological, and gravity meter parties in the field 18 months ago. The number slipped to 22 parties in December. It slipped further to about 11 parties in the field this summer.

Estimates for this fall are that only five survey parties will be in the field in all of Venezuela. This will include one seismic crew and four geological teams. No gravity parties are expected to be at work at all.

Many geophysical operators and contractors are pulling out of the

country. Offshore Exploration group, Seismograph Service Corp., and Rogers Geophysical reportedly are moving out playback equipment. Rogers hopes to set up shop in Libya. United Geophysical is the only contractor left within the country with playback equipment. A former oil company seismologist who opened a consulting business in Caracas late last year is closing up and moving to Colombia.

Argentina is taking over as the most important drilling area in South America. Twenty more rigs have gone into operation this year. This brings to about 88 the total rotaries making hole for YPF and for companies drilling under special contracts. More and more rigs are due to go into operation in programs scheduled to raise crude output to at least 290,000 bbl. daily in 1962.

Colombia now has more wildcats in progress than Venezuela. Of the 28 rotaries in operation, 18 are on exploration wells.

One of the wildcats, La Heliera 1, is being drilled by Mobil 600 miles from tidewater in the Llanos. The local Royal Dutch-Shell subsidiary, which has acreage in the same general area, reportedly put up dry-hole money for the test.

Drilling in the island areas of the Caribbean has all but ended, with rotaries either stacked or moved out altogether. Only one rotary is currently making hole in Cuba. This is a Texaco test in Las Villas province, drilling ahead at 5,525 ft.

Libya blossoms . . . Rigs unloading onto Tripoli docks are getting to be a familiar waterfront sight as more rotaries come into Libya in the wake of discoveries and stepped-up exploration programs.

Seven more rigs have gone into operation in the last 4 months, bringing the total to 15. Nine operators have one or more rigs active.

Oasis Oil Co. (Ohio) is the leader with four. Two are drilling in the vicinity of the discovery wells on Concession 32. The other two are on wildcats in other concessions held by the Conorada group. Oasis will add four more rigs in October. Two are enroute from the U. S., and two will be taken over when contracts with other companies in Libya are completed.

Libya and the rest of Africa continue to be the hottest new exploration areas in the world today.

The French are keeping up the high level of drilling with 40 rigs active in Algeria, and 11 in French Equatorial Africa.

Royal Dutch and British Petroleum have eight wells drilling in Nigeria, including two from barges. One rig is at 1,600 ft. in Bomu 10, a development well in a last year's field discovery.

Iran active . . . More rigs are making hole in Iran than in any other Middle East country.

The operating company for the consortium has six rotaries working. Saran Nos. 22, 23, and 24 are being drilled as part of the development program that includes a new terminal on Kharg island. A fourth rig also is on field development, drilling Aga Jari 56 at 8,534 ft. The two other rotaries are drilling wildcats along the coast. Kuh-I-Binak 1 is at 10,298 ft., and a new test, Kuh-I-Mund 1, is at 1,000 ft.

National Iranian Oil Co. is drilling four wells on its own account. One rig is drilling Alborz 8, and another is working at Naft-I-Shah. Two rotaries are making hole on the Sarajeh structure, discovered south of Alborz last year.

Only two rigs are active in Kuwait. One is drilling Raudhautain 27. The other is deepening Mutriba 1 at 10,700 ft.

Depletion Sought

. . . by German producers to offset loss of tariff.

WEST GERMAN crude producers are seeking a depletion allowance based on the American pattern.

The measure is being sought in order to save the local industry when tariff protection ends early in 1964. This will take place under a common market agreement of the European Economic Community, to which West Germany belongs. A depreciation allowance on external investments also is being asked for.

Theodore Telle, chairman of the crude-producers association, said that without an alternative to the tariff, local production might come to a standstill.

German production has risen to about 100,000 bbl. daily at present, more than double any other country in Western Europe. Output comes from nearly 80 small fields. The largest, Ruehlemoor, averages only about 8,400 bbl. daily.

Local producers, as their American counterparts, are pinched by rising costs and lower crude prices. New big-inch lines being built into the country are adding to the squeeze. Fuel oil, the country's most used product, does not have a tariff to begin with, and locally-made fuel oil is already facing stiff competition from imports.

FLAMES and billowing smoke during height of blaze in the Caspian Sea.

Russian Rig Razed

. . . by fire after blowout at well in Caspian Sea.

A RUSSIAN drilling rig and platform in the Caspian Sea have been destroyed by fire.

Flames shot 230 ft. into the air following the blowout and fire at exploratory well No. 674 in Russia's Neftyaniye Kamny (Oil Rocks) offshore field east of Azerbaijan's Apsheron peninsula.

The fire, which at one time covered a 7-acre area, was extinguished with underwater explosives after it had burned for 9 days. Russia has rarely publicized disasters of any kind, but a story and pictures of the Neftyaniye Kamny fire were published in the Soviet press. Observers said it indicates Russian censorship is being eased.

The Neftyaniye Kamny oil field is built on a maze of pilings and trestles in the Caspian Sea about 60 miles from the city of Baku. The field produces about 120,000 bbl. daily. Russian Seven-Year Plan calls for "nearly doubling" the field's output in the 1959-1965 period.

New Pemex Program Making Headway

PEMEX is beginning to show a few accomplishments in its expansion program designed to make Mexico's oil industry self-sufficient and a bulwark of the nation's industrial economy.

From talks with oil executives in Mexico City, this much is known on current status of the program undertaken after Pascual Gutierrez Roldan became director of Pemex last winter:

... **Drilling** is picking up slowly, should be strong in the second half of the year.

... **Construction** projects are in various stages.

Pipeline work is furthest advanced, with one line nearly completed and others started. Work on petrochemical plants is in the design stage now that financing has been assured.

... **Administration moves** include a wage increase and an attempt to reduce personnel and trim costs to balance the agency's budget.

More rigs . . . Private drilling contractors are being encouraged to participate in the big drilling program.

Eight contractors—five of them newcomers—as a result have brought 16 rigs into the country to fulfill contracts calling for a total of 140 wildcat wells this year. The drilling goal for 1959 has been set at 477 wells with emphasis on wildcats.

Contractors who have added to their equipment include Perforadora Reynosa, Perforadora Cerro Azul, Servicios Petroleros Eisa, Perforadora Mexicana, Permesa, Perforadora Latina, Construcciones Alpha, and Perforadora del Golfo.

The companies buying new rigs are helped in financing them by a Pemex guarantee of payments. This guarantee is not available for buying old rigs, however. The new contracting firms established to participate in the drilling program get their technical personnel and help from Pemex and most of their financial backing from American interests.

Footage prices for drilling vary from $8 in Poza Rica to $5.69 in the Isthmus region. The Poza Rica area calls for deep drilling—8,000 ft. and over—and Isthmus drilling is made difficult by jungle terrain and swamps.

The rising strength of Mexican contractors emphasizes the current trend against the oil participation type of contract for developing the nation's oil resources. Mexico City sources say they believe Edwin Pauley of Los Angeles probably will be the last operator to have this type of contract. From now on, Pemex will direct the whole drilling and development program.

Pauley currently is pushing drilling operations on his concession in the north and in the Isthmus area. His deal calls for 15% of any onshore production he develops and 18.25% of offshore production near the Isthmus. Pauley thus is striving to establish production before his concession expires in 1962 in the north and in 1964 in the Isthmus.

Construction . . . The wheels are beginning to turn on a series of big construction projects for which more than $70-million in foreign loans have been obtained.

Mexican contractors have begun work at both ends of a 24-in. gas pipeline from Pemex City to Mexico City. Workers are clearing right-of-way and stringing pipe along most of the line's 500-mile length. A $40-million loan from U. S. banks is financing the project.

Workers also have nearly completed a gas pipeline from Monterey to Torreón. A products line over the same route will be built later. Construction of three petrochemical plants and expansion of the Tampico refinery is reportedly in the planning and design stage. Contracts have been let for only part of the work.

The Mexican Congress, meanwhile, has placed the basic petrochemical industry under the direction of Pemex, through a law passed last November.

The Congress must now determine what will be the basic petrochemicals to be manufactured by Pemex. The basics thus far are butadiene, ammonia, methanol, ethylene, toluol, benzol, glycol, acetone, and polyethylene.

Administration . . . Pemex recently signed a new contract with the labor unions calling for higher wages and increased fringe benefits.

Cost of the new contract will total about $8.8 million annually.

The unions agreed to participate in a company-union commission to investigate labor practices. Management spokesmen earlier had charged that waste, inefficiency, and labor corruption hampered the oil industry (OGJ, Feb. 23, p. 91).

The wage increase will add to Pemex budget woes. Earlier published reports in Mexico put budgeted expenses this year for Pemex at 5.46 billion pesos and income at 5.2 billion pesos. That's a deficit of 260 million. Officials planned to bring the budget nearer balance through eliminating unnecessary expenses and tighter purchase control.

Pauley Hits With Stepout

A DUAL producer has been completed by Edwin W. Pauley in his first stepout to the discovery well for Santa Ana field in the Gulf of Campeche off Mexico's Tabasco state.

The well tested 2,340 bbl. daily of 38°-gravity oil through choke. The upper zone tested 744 bbl. daily at 5,720 ft. The lower zone at 8,031 ft. tested 1,596 bbl. daily.

The discovery well, also dually completed between 7,000 and 10,000 ft., tested a total of 1,684 bbl. daily. It has been shut in pending completion of pipeline and storage tank facilities now expected within a few weeks.

Pauley is developing Santa Ana offshore field under contract with Pemex. He is planning to move in more drilling equipment. These include a mobile barge, a floating barge, and two land-based rigs for slant-hole drilling.

Iraq Wildcat Hits

. . . in upper zone. Driller still hunts deeper pay.

A WILDCAT well in Iraq, aiming at testing deepest horizons at Bai Hassan, has tested an upper Cretaceous limestone at the rate of 2,000 bbl. daily.

The well, 25 miles west of the big Kirkuk producing trend, is a crestal location in a Mio-Oligocene limestone pay found at about 4,900 ft. All the shut-in wells are located on the flank of the structure.

The test of Bai Hassan 13 was made of the 4,270-4,430-ft. interval similar to the upper pay found in Ain Zalah, to the north. The well is being deepened, still looking for the primary Cretaceous pay that produces at Ain Zalah.

Kewanee to Drill in Cuba

CUBAN KEWANEE Oil Co. plans a drilling program of five or six wells in Pinar del Rio province west of Havana, Cuba.

Target date for spudding the first test is September 1. Kewanee rigs and

personnel will be used for the operations.

Kewanee will be the operator on the wells and will drill a total of 35,000 ft. of hole in the tests under a farmout arrangement with Atlantic Oil & Refining Co. The deal involved acreage scattered throughout a large Atlantic holding in the area.

Locations have been made on the basis of seismic data. There is little known about the geology in the area. Some closures have been detected, but production, if any, is expected to come from stratigraphic traps.

British Firm Buying

. . . company set up to build refinery project in Panama.

A BRITISH holding company is taking over a proposed $50-million refinery project in Panama.

Ultramar, Ltd., has completed arrangements to acquire Panama Refining & Petrochemical Co., Inc., of Los Angeles. The deal is believed to include a cash payment and an exchange of stock.

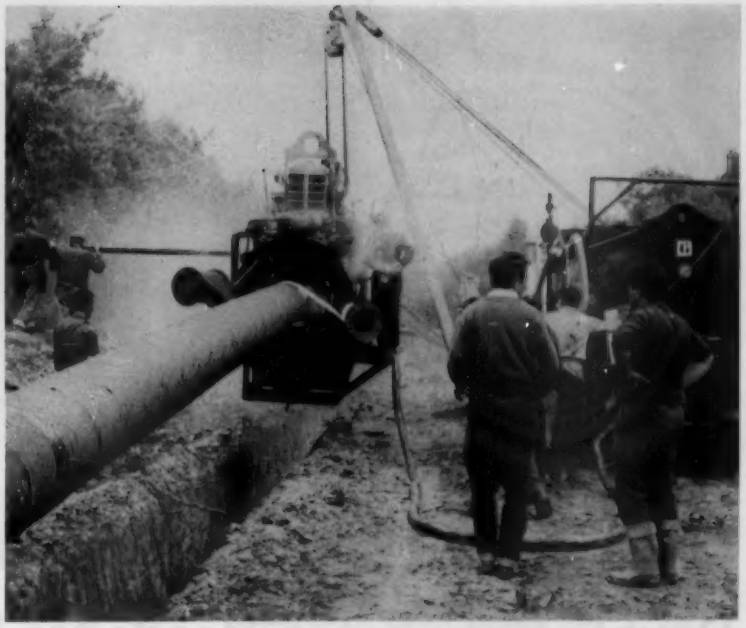
Panama Refining was set up more than 2 years ago by two East Coast investors, John Shaheen, of New York, and Eugene Du Pont, III, of Wilmington, Del. A construction contract for a 55,000-bbl. refinery was signed in the spring of 1957. The location was to be at a site on the Atlantic coast of Panama, but construction has not yet started.

The co-owners said at the time that a satisfactory agreement had been made with the Panamanian Government. There was to be a tax umbrella guaranteed for 25 years. There were to be no taxes levied on exports, the destination of most products, and the import duty on crude was to be only 1% per barrel.

Contracts also were in hand assuring both crude supplies and a market for most of the products (OGJ, May 20, 1957, p. 131).

Other holdings . . . The move is a departure for Ultramar, which has confined its interests largely to exploration and production properties, mostly in Venezuela. A wholly owned subsidiary, Caracas Petroleum, S. A., has half interest in S. A. P. Las Mercedes, which produces about 34,000 bbl. daily in Eastern Venezuela. Texaco is the co-owner.

Caracas Petroleum also has interests in a number of royalty companies in Venezuela, and it operates some properties on its own account. But its own crude production has been negligible.



Lacq Pipeline Moving Close to Paris

THE EIFFEL Tower should soon be in view of the pipeline spread hurrying toward Paris. The pipe-laying team has reached Ozoir-la-Ferriere, 18 miles south of the French capital. The 550-mile 24 and 20-in. trunk line from Lacq gas field in southern France will open on a limited basis this fall. Gas de Franz, the government company building the system, is also opening feeder lines this year to Nantes and Lyon. The pipeline system is a key part of a $250-million program to utilize the Lacq reserves.

Sahara Crude Line Completed

THE FINAL line weld of the 397-mile Hassi Messaoud-to-Bougie pipeline to move French Sahara oil to the Mediterranean coast was completed last week.

The 24-in. crude carrier is expected to be moving a minimum of 100,000 bbl. daily of the high-quality Sahara crude within a month.

Work is progressing on the necessary terminal facilities at Bougie, the pump stations on the line, and storage needed for the major line to operate.

Completion of the pipeline outlet for the big French field marks the first step in full-scale production of the oil which the French have found at Hassi Messaoud.

For the past 20 months, the two French companies operating the field have been shipping an ever-increasing amount of crude to the north by small pipeline and rail.

Since December 1957, the companies have produced almost 6 million barrels of oil at Hassi Messaoud. Last month the two firms shipped an average of 15,100 bbl. daily through the hastily built 6-in. pipeline to Touggourt and then by rail to Philippeville on the coast.

The two companies, SN Repal and Cie. Francaises Petroles (Algerie), now have 41 productive wells on the massive Hassi Messaoud structure. The two companies have 14 rigs at work in the field.

ENI makes Sudanese deal

THE ITALIAN oil company has agreed to drill in another country on a 75-25 basis.

Reports from Rome say ENI has acquired a concession over a 3,500-sq.-mile area in Sudan along the Red Sea coast, including offshore areas. If commercial production is developed, the agreement calls for a profit split of 75% for the Sudanese Government, and 25% for ENI.

ENI was the first company to break away from the standard 50-50 profit split, in effect in most parts of the world. Other 75-25 deals have been made with Iran, Egypt, and Morocco.

Double-Duty Barge Heads for Persian Gulf

A DUAL purpose construction barge will soon be leading two lives in 80-ft. waters at the head of the Persian Gulf.

The barge left England recently headed for southern Iraq, 7,000 miles away. When the barge arrives next month 24 miles south of Fao, it will be split in half. Each of the "halves" will put down hydraulically operated legs to the ocean floor and become working platforms to build a 1,200-ft. crude-oil terminal.

When the new deepwater loading terminal for Basrah Petroleum Co., an affiliate of Iraq Petroleum, has been completed, the two platforms will become permanent structures and parts of the terminal. The forward half of the barge is equipped with a large crane for pile driving. It will become a heliport as part of the permanent terminal. The stern section carries three-story, air-conditioned, permanent living quarters.

The novel barge unit was built in England for Raymond International (U. K.) Ltd., Richard Costain Middle East, Ltd., and DeLong Overseas, Ltd., partners in the joint venture.

The big new offshore terminal will relieve one of the major bottlenecks in the way of Iraq's planned expansion of production. The country's southern fields, Rumaila and Zubair, have been limited in output by the shipping facilities at Fao, the country's southern port. Fao can only accommodate shallow-draft, small tankers. The new terminal will be able to load two 65,000-ton tankers at the same time.

The new loading terminal will be supplied by a pair of 32-in. submarine crude lines from Fao.

FOREIGN BRIEFS . . .

Argentina is seeking bids on materials needed for a $20-million drilling and production program in the south side of Comodoro Rivadavia field. Manufacturers, suppliers, and financial companies can submit bids up until noon, September 21.

A 20,000-bbl. refinery at Home, Syria, has officially opened. Czechoslovakia built the government-owned plant for about $16 million.

Six 2,000-sq.-mile concessions have been awarded by the Burmese Government to General Exploration Co. of California. The rights lie along the Irrawaddy River, with four areas adjacent to producing properties of Burmah Oil Co. The licenses will be valid for 2 years.

British Petroleum is writing off the exploration possibilities of Malta. The company has decided to give up its concession after abandoning Naxxar 1 wildcat at about 9,800 ft.

A 60-mile Brazilian crude line will be completed this week by Petrobras, S. A., from Mataripe to Madre de Deus. Techint has the contract for the 2, 4, 6, and 12-in. system to supply the Mataripe refinery. Techint has just completed a 40-mile 12-in. crude line from Catu to Madre de Deus for Petrobras, the Brazilian government company, and has done the engineering for a 70-mile 22-in. crude line from S. Sebastiao to Cubatao. The contractor also has completed engineering of 25-mile 6-in. ethylene line from Cubatao to Rio Grande for Estrada Ferroviaria Santos a Judiai, Sao Paulo, Brazil.

Oil has been discovered for the first time in southern England. British Petroleum plans a production test on a well at Kimmeridge Cliffs, Dorset, a county bordering on the English Channel. The company has not indicated the size of the find, but a second rig has been brought in to help evaluate the structure. Two stepouts are being drilled.

A 10,000-sq.-mile aerial magnetic survey is under way on a concession granted by the Union of South Africa to Trans-American Mining Corp. The concession is the first issued for oil and gas rights in the Union of South Africa. It is in the Namid Desert sedimentary basin on the west coast. Hunting Geophysics, Ltd., London, is conducting the survey.

NOW be Sure—BE SAFE...

Rig Up With Safety-Weigh

CONTROL INDICATOR

Easy Quick Installation

- Accurate Hook and Swab Loads
- Extra Rugged for Heavy Jarring
- Sensitive to Foundation Guyline — Wind — Mast Column Load Changes
- Ends Guesswork

Safety-Weigh Models

MODEL "S"
For single pole mast-single base with 14' hose, 6" indicator face, w/set of 4 type "M" hook load dial faces.

MODEL "SD"
For portable derricks, drive-ins, double pole mast-two bases with 14' hose each. Two 6" instruments w/set of 4 type "D" hook load dial faces.

INSTALLS UNDER THE LOAD
Made to receive derrick or pole load between foundation and derrick leveling screws. Does not fasten to wire lines. No changing of installation when string up changes.

★ On a drive-in derrick rig from Hobbs, New Mexico — As full power was applied on pulling a stuck packer, operator and engineer saw the indicators for each leg vary suddenly. Power was shut off. A check showed a broken sill close to one leg. An accident was prevented.

★ On Double-pole mast pulling unit from Winters, Texas — Rig was left standing rigged up waiting for orders . . . crew returned and checked Safety-Weigh. One leg was showing no load. Surface soil under the sill looked good but further checking showed cellar caved in. Another accident prevented.

★ Self-propelled derrick unit at Lovington, New Mexico — Spring wind storm gust rocked derrick until no load was indicated on one leg and more than doubled rig load on other leg. Superintendent advised further guying and crew abandoned rig as safety measure.

Approved and recommended by production superintendents and farm bosses. In use thru-out the southwest by leading contractors. PROTECTION FOR YOUR MEN — PROTECTION FOR YOUR EQUIPMENT.

Send for **FREE** *handy Chart on Rod and Tubing Weights*

AVAILABLE THRU ALL SUPPLY STORES

A PRODUCT OF
PENNANT, INC.
TULSA, OKLA.

DISTRIBUTED BY →
in Midcontinent — Rocky Mts. — Canada

BMW

BRADFORD MOTOR WORKS
TULSA, OKLA. - BOX 55
ODESSA, TEXAS - BOX 2509
BRADFORD, PA.

An Announcement

Hughes Tool Company can now announce the successful development of the first practical and effective bearing seal for a rock bit that seals in a bearing lubricant and seals out drilling and formation fluids.

The results, from a long series of field and laboratory tests, have demonstrated that these lubricated sealed bearings will substantially increase bearing life and the drilling life of the bit, where bearing life has been the limiting factor.

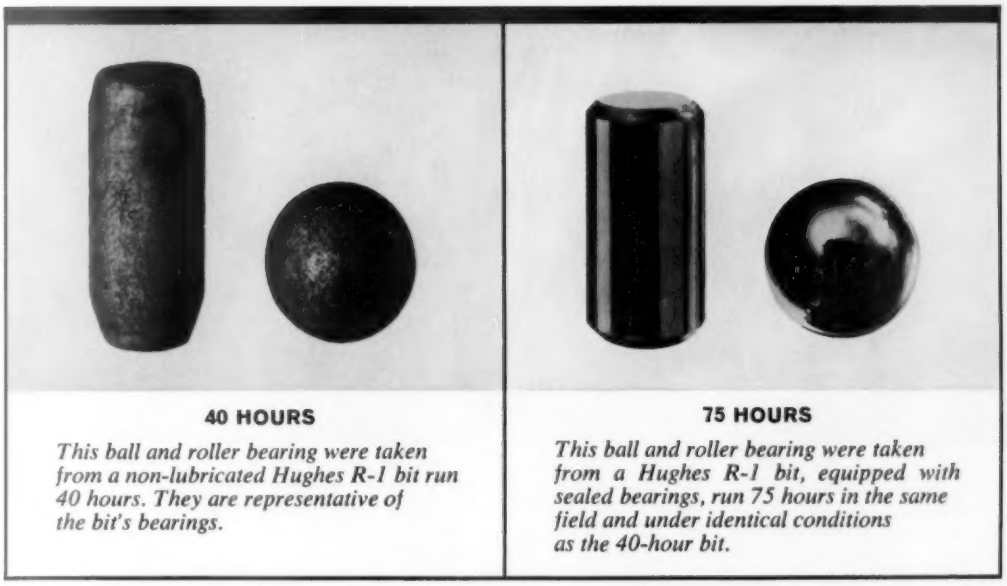
We now stand on the threshold of another series of Hughes developments that will lead to further important drilling economies.

The drilling industry can appreciate that the development of a successful bearing seal has been difficult and costly. There is still much to be learned before we can determine the full extent of its application to all sizes and types of bits.

In developing the sealed bearings, we have, so far, largely concentrated on one size and on one type of the R Series insert bits. We concentrated on insert bits because we felt that the industry had the most to gain from extending the life of these bits in the hole . . . and by having them available in quantities at the earliest possible date.

A target date of January 1 has been set to have the first production sealed-bearing bits available for distribution in the type RG-1J, 8¾″ size. With regard to the other sizes in the insert series, and as to other types and sizes, distribution will be at the earliest date they can be produced, consistent with the Hughes policy of thoroughly testing each design before it is released to the field.

FRED W. AYERS
Senior Vice President and General Manager
Hughes Tool Company



40 HOURS

This ball and roller bearing were taken from a non-lubricated Hughes R-1 bit run 40 hours. They are representative of the bit's bearings.

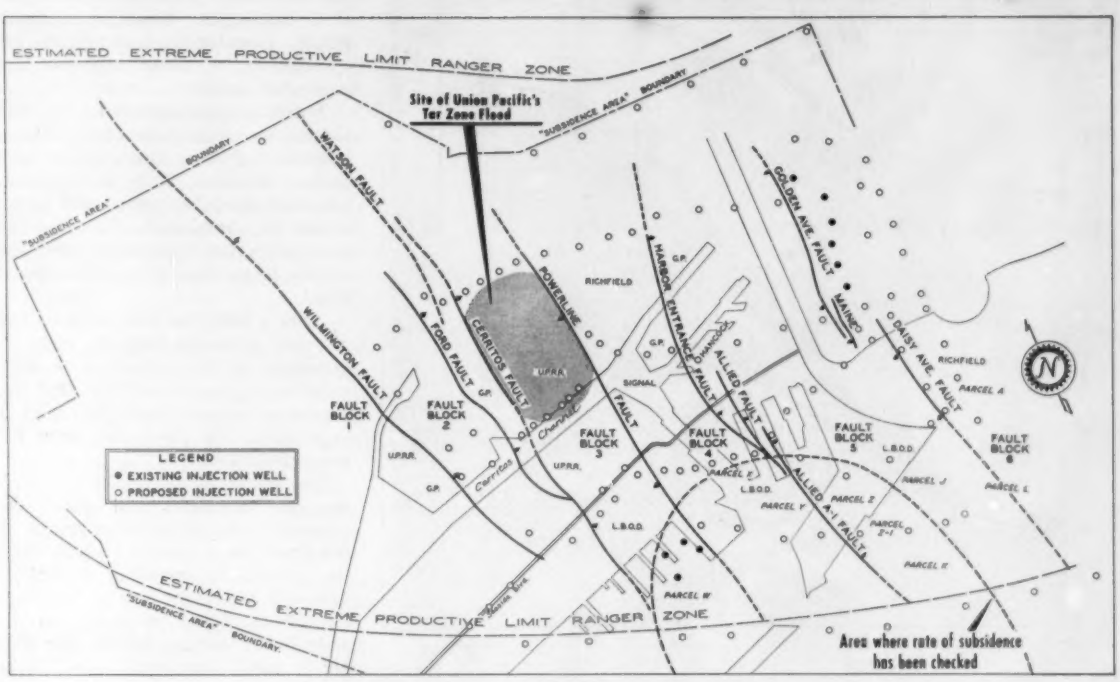
75 HOURS

This ball and roller bearing were taken from a Hughes R-1 bit, equipped with sealed bearings, run 75 hours in the same field and under identical conditions as the 40-hour bit.

These photographs are unretouched. The irregular shadows you see in the bearings (above right) are the camera and lights reflected by the mirror-like surfaces of the bearings.

Tanganyika. A Failing 2500 test rig. BP is currently engaged in the search for new sources of oil in 6 far separated regions of the continent of Africa.

BP



The series of faults which divide California's Wilmington field will be basis for

World's biggest water flood

• By mid-1960 more than 1 million barrels per day of water will be injected through 230 wells. Current injection rate is 215,000 bbl. daily. Oil recoveries will be increased by 400 million barrels.

BY D. H. STORMONT
West Coast Editor

OPERATORS in the Long Beach Harbor area of Wilmington field are moving ahead at full speed toward establishing the world's largest water flood.

Currently about 215,000 bbl. daily of ocean brine is being injected in several separate projects. By next July all of the field except the northern and western edges may be under flood. If all goes as planned, at that time more than 1,000,000 bbl. of water daily will be going underground through 230 injection wells.

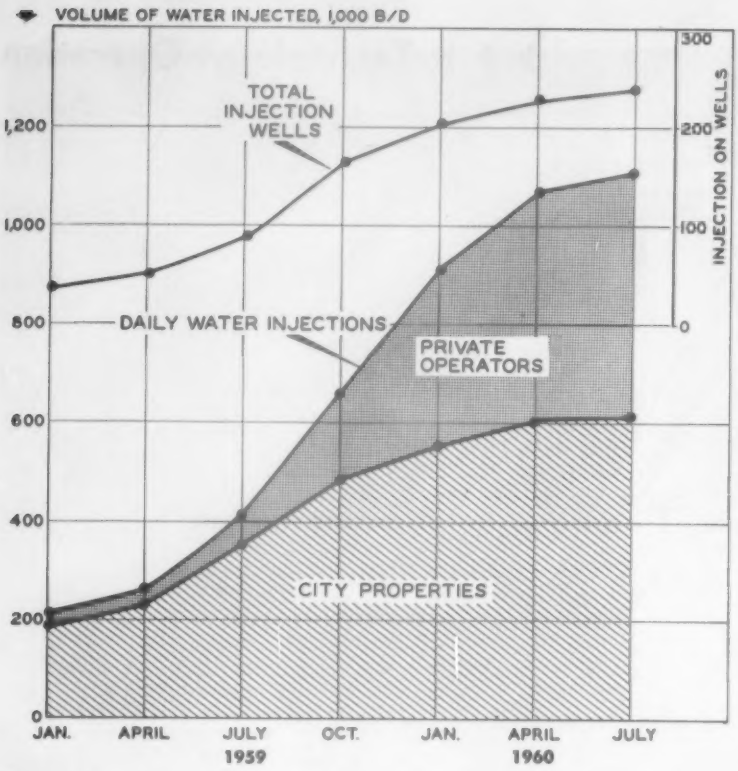
The huge operation will involve an expenditure of about $65,000,000. It is expected to increase ultimate oil recoveries by some 400 million barrels, but this will not be its sole purpose. Equally important, from the viewpoint of businesses and residents in the area, is the fact it is expected to check land subsidence.

This is the reason the program is proceeding on a "crash" basis. The land surface in one portion of the field has sunk about 25 ft. and is continuing to sink at a rate of almost 1 ft. per year. If permitted to continue, ultimate subsidence may reach 43 ft. at the center of the bowl-shaped area. Downtown Long Beach may settle about 5 ft., some engineers have estimated.

Operating units formed . . . So that repressuring can be carried out most practically and efficiently, unit or cooperative agreements are being set up in most of the field's 6,800 developed acres. This is being done by fault blocks. (See map.)

To expedite getting large volumes of water going underground, cooperative agreements will first be adopted in most cases. To prevent oil migrating from one property to another, lines of injection wells will be drilled along common boundaries and a wall of water built up. The amount of water injected into each property also will be regulated to keep migration from occurring.

Ultimately, however, unit operations will be undertaken in at least four fault blocks. A unit operator will take over and participating companies will share in oil production ac-



TIMETABLE set up for the volume of water to be injected, and number of injection wells.

cording to their equity. In the studies under way, two equities are being established: The current net worth of the remaining primary oil, and that which will be produced by water flooding.

Present production is the key factor for the primary oil formula, while acre-feet of oil sand is the base for estimating water-flood recoveries. Both recoveries are corrected for such factors as position on structure and oil gravity.

The five series of faults which divide the area are expected to provide seals against oil migration as long as pressures are fairly uniform. Within each fault block, flooding will be carried out through peripheral and pattern injectors. The entire operation is under the over-all supervision of the State Division of Oil and Gas.

During the fillup period of approximately 3 years, ocean water secured from shallow wells will be injected. Drilling of these source wells and building of the high-pressure injection plants is being financed by the city of Long Beach, which owns 40% of the production in the subsiding area. Where the facilities supply water to oil companies, the cost will be repaid from the increased oil recovery. The water will be injected through lines and wells provided by the unit.

Subsidence vs. oil recovery . . . The additional objective of the huge project—checking land subsidence—sets the Wilmington flood apart from others. Fortunately, however, the requirements of either objective are somewhat similar.

Injection rates required to stop subsidence are of the same order as for a conventional water flood, studies have shown. Because of the time element, however, the fillup period will be reduced to a minimum. Thus the expenditures for equipment will be slightly larger than for a conventional flood.

After a fillup has been attained and reservoir pressures restored, only requirement of the project as an anti-subsidence measure will be that the pressures be maintained. The level is expected to be about the same for either objective.

The phase of operation in which the two objectives will differ the greatest is during the latter stages of the flood. In a normal project, pressures would be permitted to decline. This will not be the case at Wilmington. Some decline might be permissible, but, if carried too far, the danger of subsidence would again be incurred.

The plan approved by the State Oil

TABLE 1—WATER AND INJECTION WELL REQUIREMENTS, FAULT BLOCK 2

Water requirements—	Tar	Ranger	Upper Terminal	Lower Terminal	Total
To offset withdrawals up to 1/1/58, 1,000 bbl.	20,990	43,088	82,655	49,921	196,654
To offset withdrawals during 5-yr. period, 1,000 bbl.	44,050	82,125	69,645	25,130	220,950
Total required, 1,000 bbl.	65,040	125,213	152,300	75,051	417,604
Avg. daily rate, bbl.	35,600	68,600	83,500	41,100	228,800
Injection wells:					
Now operating	0	0	0	3	3
To be converted	8	9	2	1	20
To be drilled	5	10	8	5	28
Total injectors	13	19	10	9	51
Oil-zone injectors	11	16	2	0	29
Peripheral injectors	2	3	8	9	22

TABLE 2—WATER AND INJECTION WELL REQUIREMENTS, FAULT BLOCK 3

Water requirements—	Tar	Ranger	Upper Terminal	Lower Terminal	Total
To offset withdrawals up to 1/1/58, in 1,000 bbl.	6,831	49,371	56,363	19,980	132,545
To offset withdrawals during 5-yr. period, in 1,000 bbl.	32,680	69,530	46,705	11,455	160,370
Total required, in 1,000 bbl.	39,511	118,901	103,068	31,435	292,915
Avg. daily rate, bbl.	21,700	65,100	56,500	14,200	160,500
Injection wells:					
Now operating	9	4	0	0	13
To be converted	8	14	0	0	22
To be drilled	7	3	4	4	18
Total injectors	24	21	4	4	53
Oil-zone injectors	20	18	0	0	38
Peripheral injectors	4	3	4	4	15

and Gas Supervisor is designed to at least partially restore reservoir pressures within 5 years. This requires that a total of almost 2 billion barrels of brine be injected during this period. An injection rate of approximately 1,113,000 bbl. daily is to be reached as quickly as the units can be formed and facilities installed. An accompanying chart shows the timetable which was set up at the first of the year. Currently, Wilmington operators are behind schedule but not so far that the 1,000,000-bbl.-daily goal won't be possible of attainment by July 1960.

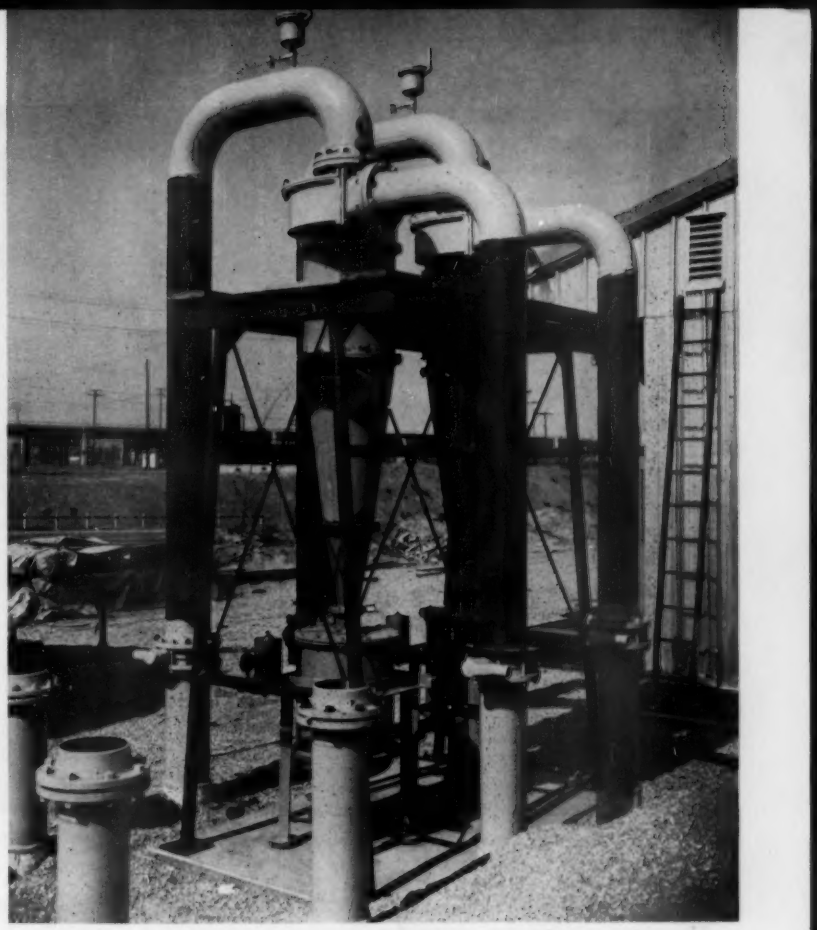
Injection-plant work . . . Injection units already in operation include one of the 120,000-bbl. capacity on Pier A and a 73,000-bbl. plant on Pier E. Both are operated by Long Beach Oil Development Co., contract operator for city properties in Blocks 4 and 5. Richfield Oil Corp., contract operator in Block 6, is operating a 48,000-bbl. plant on Pier A. Other plants in operation are the 20,000-bbl. plant used for carrying out a pilot flood in Block 5, and a 45,000-bbl. plant of Union Pacific Railroad Co. in Block 2.

Work under way includes expansion of the Pier E plant to a daily capacity of 123,000 bbl., and that of the Richfield plant to 66,000 bbl. A 50,000-bbl. plant also is almost completed in the harbor area. As at the Pier E plant, delays in the delivery of gear boxes have held up completion. Both plants are expected to be in operation by late September.

Three other city-owned plants are scheduled for completion before the end of the year. These include a 50,000-bbl. plant at Magnolia pier in downtown Long Beach. Two huge plants for the floods in Blocks 2 and 3 are under construction near the Navy shipyards. One plant will have a 157,000-bbl. capacity and the other will be capable of injecting up to 297,000 bbl. daily.

Total cost of the plants, lines, and injection wells will be about $31,000,000, it is estimated. The plants alone will cost about $7 per barrel daily capacity. Estimated average cost of the water delivered to the operator, including operating costs and amortization of the facilities, will run something less than 1 cent per barrel.

Before January 1961, the number of injection wells will be increased to 238. These will be distributed through the various fault blocks as shown in Tables 1-5. The number does not include any which may be used on the north flank of Blocks 2, 3, and 4. About 110 of the injectors are to be new or redrilled wells, com-



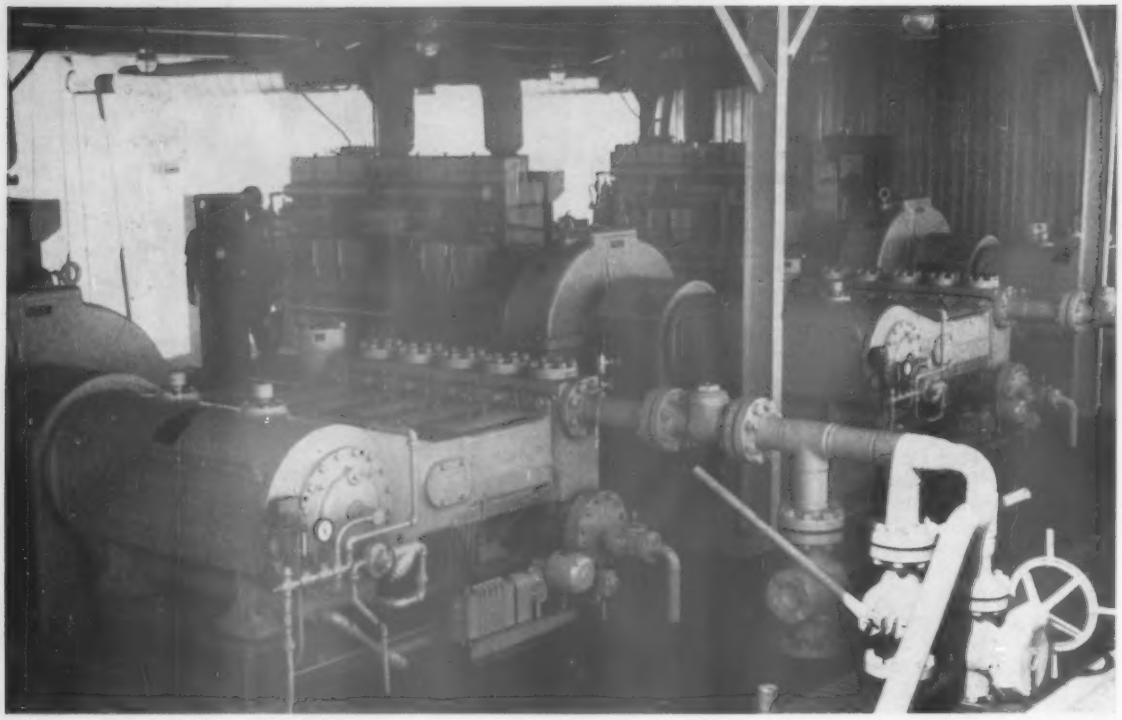
CENTRIFUGAL DESANDING is new method for removing sand particles from seawater. These desanders, being tried at one plant, take the place of storage tanks used at other plants.

TABLE 3—WATER AND INJECTION REQUIREMENTS, FAULT BLOCK 4

Water requirements—	Tar	Ranger	Upper Terminal	Lower Terminal	Total
To offset withdrawals up to 1/1/58 in 1,000 bbl.	15,880	61,610	179,550	129,860	386,900
To offset withdrawals during 5-year period, in 1,000 bbl.	25,400	40,300	68,800	35,500	170,000
Total required, in 1,000 bbl.	41,280	101,910	248,350	165,360	556,900
Average daily rate, bbl.	22,600	55,800	136,100	90,600	305,100
Injection wells:					
Now operating	1	0	1	2	4
To be converted	8	17	0	0	25
To be drilled	0	6	15	13	34
Total injectors	9	23	16	15	63
Oil-zone injectors	5	19	0	0	24
Peripheral injectors	4	4	16	15	39

TABLE 4—WATER AND INJECTION WELL REQUIREMENTS, FAULT BLOCK 5

Water requirements—	Tar	Ranger	Upper Terminal	Lower Terminal	Total
To offset withdrawals up to 1/1/58, in 1,000 bbl.	18,670	85,900	54,750	38,260	197,580
To offset withdrawals during 5-year period, in 1,000 bbl.	25,830	67,940	43,080	18,100	154,950
Total required, in 1,000 bbl.	44,500	153,840	97,830	56,830	352,530
Average daily rate, bbl.	24,400	84,300	53,600	30,900	193,200
Injection wells:					
Now operating	0	0	3	3	6
To be converted	7	21	0	0	28
To be drilled	5	4	8	7	24
Total injectors	12	25	11	10	58
Oil-zone injectors	8	21	0	0	29
Peripheral injectors	4	4	11	10	29



PIER A PLANT with capacity of 120,000 bbl. of water injection per day is already in operation by Long Beach Oil Development Co.

pleted within the next 15 months.

The accompanying map shows the planned location of injection wells for the Ranger zone, most extensive of the five zones to be flooded. Most of these injectors, and particularly those on the flanks, will initially be used for injecting in the shallower Tar zone and in the deeper Terminal and Ford zones. As the flood progresses, additional upstructure injectors probably will have to be drilled in order to better control the water input to each zone.

Water-source wells, some 200 to 400 ft. deep, are being drilled as the flood's demands increase. Composition of the brine is comparable to ocean water except that it is oxygen-free (less than 0.12 p.p.m.) and has a low turbidity (2 to 3 p.p.m.). Most of the source wells in the 200-ft. range are capable of a sustained output of 10,000 to 15,000 bbl. daily. No filtration is required but there is a severe corrosion problem, as discussed later.

Reservoir data . . . As reflected in Tables 6-10, only a small portion of the total oil in place has been recovered from the various zones in each block. (Data in Tables 6-10 based on State of California, Division of Oil and Gas Report S 59-1, Feb. 1959.) Recoveries from the shallower Tar and Ranger zones have been particularly low, as might be expected in

TABLE 5—WATER AND INJECTION REQUIREMENTS, FAULT BLOCK 6

Water requirements—	Ranger	Upper Terminal	Lower Terminal	Union Pacific	Ford	Total
To offset withdrawals up to 1/1/58, in 1,000 bbl.	23,926	19,376	11,163	1,748	4,359	60,572
To offset withdrawals during 5-year period, in 1,000 bbl.	13,728	10,798	7,015	2,216	2,738	36,495
Total required, in 1,000 bbl.	37,654	30,174	18,178	3,964	7,097	97,067
Average daily rate, bbl.	20,600	16,500	9,900	2,200	3,900	53,100
Injection wells:						
Now operating	6	1	4	0	0	11
To be converted	5	1	0	0	0	6
To be drilled	18	3	1	2	2	26
Total injectors	29	5	5	2	2	43
Oil-zone injectors	26	0	0	0	0	26
Peripheral injectors	3	5	5	2	2	17

TABLE 6—RESERVOIR PROPERTIES AND PRODUCTION DATA, FAULT BLOCK 2

	Tar	Ranger	Upper Terminal	Lower Terminal
Gross volume, acre-ft.	58,040	115,344	151,323	89,574
Average porosity, %	34	37	35	33
Average connate water, %	18	23	25	29
Average permeability, md.	1,600	1,600	700	500
Average oil gravity, °API	14	22	24	29
Initial reservoir pressure, psia.	1,040	1,210	1,390	1,610
Initial solution GOR, cu. ft./bbl.	92	155	210	303
Initial oil in place, bbl./acre ft.	2,046	2,031	1,827	1,539
Total initial oil in place, 1,000 bbl.	118,766	234,294	276,666	137,857
Cumulative production to 1/1/59, 1,000 bbl.	*29,000	.....	*84,000	.....
Oil production as of 1/1/59, bbl./day	*3,100	.....	*6,200	.....
Number producing wells, 1/1/59	*141	.....	*126	.....
Average well depth, ft.	*2,976	.....	*3,750	.....

*Production is commingled from Tar and Ranger wells, and from upper and lower Terminal wells; individual zone production data not available.

view of their lower-gravity crudes.

Present estimates give Wilmington field a primary oil reserve of about 225,000,000 bbl. This would place its ultimate primary production at approximately 1,000,000,000 bbl., or about 20% of the oil in place. The water-flooding activities will add some 500 to 600 million barrels of secondary-recovery oil, according to the estimates of some engineers connected with the project.

These reserve figures, of course, are exclusive of any oil which may be produced in the approximately 5,000-acre area southeast of present developed limits.

Most of the oil zones to be flooded are loosely consolidated, silty to medium-grained, poorly sorted sands. Zone thicknesses vary. In most cases the flooded interval will be several hundred feet thick. The sands have high horizontal permeabilities and high porosities, as the data in Tables 6-10 reveal.

Pilot-flood results . . . That flooding can be carried out successfully, and subsidence halted, has been shown by several pilot projects. These have been in the deeper Terminal zones as well as in the shallower Tar and Ranger sands. Their combined production of water-flood oil is estimated to be about 6,000 bbl. daily.

One project, involving some 65 acres of an upper Terminal subpool in Block 5, has been under way since 1953. Very shortly after water injection was started through two flank wells, the decline in reservoir pressures was checked. Later the oil-production decline curve flattened out. As of the first of this year it was estimated that 1,425,000 bbl. more oil already had been produced than would have been without water injection.

From this initial operation in a single sand, water injections have been expanded to all of the upper Terminal and started in the lower Terminal and Tar zones in parts of Blocks 4, 5, and 6. Pressure declines in these sands have been stopped on the south flank. Likewise the effects on subsidence have been very encouraging. A survey last February showed it had been halted in 500 acres on the south flank of Blocks 4 and 5. In an additional 750 acres the rate of sinkage had been materially reduced.

A pattern flood carried out by Union Pacific Railroad Co. in Tar sands in Blocks 2 and 3 has shown that flooding of low-gravity, viscous crudes can be done quite successfully. Full-scale operations should be under way by the year's end as operators in this portion of the field al-

TABLE 7—RESERVOIR PROPERTIES AND PRODUCTION DATA, FAULT BLOCK 3

	Tar	Ranger	Upper Terminal	Lower Terminal
Gross volume, acre-ft.	43,481	117,101	93,055	31,941
Porosity, average, %	35	36	33	33
Connate water, average, %	18	23	25	29
Permeability, average, md.	1,600	1,600	700	500
Oil gravity, average, °API	14	22	24	29
Initial reservoir pressure, psia.	1,040	1,210	1,390	1,610
Initial solution GOR, cu. ft./bbl.	92	155	210	303
Initial oil in place, bbl./acre-ft.	2,118	1,977	1,739	1,539
Total initial oil in place, 1,000 bbl.	92,115	231,469	161,853	49,158
Cumulative oil production, 1/1/59, 1,000 bbl.	*32,992	.....	38,417	11,420
Oil production, 1/1/59, bbl./day	*3,400	.....	2,900	600
Number producing wells, 1/1/59	*145	.....	58	23
Average well depth, ft.	*3,005	.....	3,555	4,050

*Production is commingled from Tar and Ranger wells; individual zone production data not available.

TABLE 8—RESERVOIR PROPERTIES AND PRODUCTION DATA, FAULT BLOCK 4

	Tar	Ranger	Upper Terminal	Lower Terminal
Net sand volume, acre-ft.	53,926	149,277	230,575	190,691
Average porosity, %	36	36	33	32
Connate water, average, %	20	23	25	30
Permeability, average, md.	1,500	1,550	775	405
Oil gravity, average, °API	14	18	19	27
Initial reservoir pressure, psia.	1,049	1,335	1,467	1,687
Reservoir pressure, 1/1/58, psia.	370	391	266	194
Initial solution GOR, cu. ft./bbl.	93	158	191	294
Initial oil in place, bbl./acre-ft.	2,125	2,009	1,750	1,475
Total initial oil in place, 1,000 bbl.	114,620	299,957	403,552	281,307
Cumulative oil production, 1/1/59, 1,000 bbl.	6,898	35,506	*183,315	.....
Oil production 1/1/59, bbl./day	1,200	3,300	*10,600	.....
Number producing wells, 1/1/59	49	165	*278	.....
Average well depth, ft.	2,550	3,112	*3,762	.....

*Production is commingled from upper and lower Terminal wells; individual production data not available.

TABLE 9—RESERVOIR PROPERTIES AND PRODUCTION DATA, FAULT BLOCK 5

	Tar	Ranger	Upper Terminal	Lower Terminal
Net sand volume, acre-ft.	102,990	300,860	104,516	61,781
Porosity, average, %	38	37	34	30
Connate water, average, %	15	22	25	30
Permeability, average, md.	6,500	1,840	800	377
Oil gravity, average, °API	13	17	20	28
Initial reservoir pressure, psia.	1,027	1,379	1,410	1,643
Reservoir pressure, 1/1/58, psia.	534	550	440	444
Initial solution GOR, cu. ft./bbl.	90	152	190	293
Initial oil in place, bbl./acre-ft.	2,045	2,063	1,776	1,404
Total initial oil in place, 1,000 bbl.	247,688	620,674	186,981	86,741
Cumulative oil production, 1/1/59, 1,000 bbl.	10,452	56,910	*56,851	.....
Oil production 1/1/59, bbl./day	3,300	4,700	*7,700	.....
Number producing wells 1/1/59	96	260	*152	.....
Average well depth, ft.	2,752	3,188	3,500	4,100

*Production is commingled from upper and lower Terminal wells; individual zone production data not available.

TABLE 10—RESERVOIR PROPERTIES AND PRODUCTION DATA, FAULT BLOCK 6

	Ranger	Upper Terminal	Lower Terminal	Union Pacific	Ford
Net sand volume, acre-ft.	122,000	50,000	30,830	12,708	21,912
Porosity, average, %	36	37	33	27	25
Interstitial water, average, %	22	29	33	46	47
Permeability, median, md.	1,540	800	385	65	55
Oil gravity, average, °API	16	19	21	24	28
Initial reservoir pressure, psia.	1,278	1,410	1,632	1,986	2,319
Reservoir pressure, 7/1/58, psia.	682	650	710	1,370	976
Initial solution GOR, cu. ft./bbl.	133	156	191	294	448
Initial oil in place, bbl./acre-ft.	2,049	1,860	1,547	958	802
Total init. oil in place, 1,000 bbl.	249,978	93,000	47,694	12,174	17,573
Cum. oil prod., 1/1/59, 1,000 bbl.	14,314	12,707	8,744	942	1,671
Oil prod., 1/1/59, bbl./day	2,800	4,500	2,100	500	500
No. producing wells, 1/1/59	79	33	18	8	11
Average well depth, ft.	4,533	4,155	4,495	5,080	5,895

ready have signed cooperative agreements.

Two plants, capable of supplying 454,000 bbl. of high-pressure water daily, are scheduled to be completed in September. By late this year as much as 400,000 bbl. daily may be going underground. As Tables 1-3 indicate, most water will be going into the deeper zones of Block 2.

Corrosion prevention . . . When pilot operations were started in 1953, corrosion was not expected to be a problem. Engineers were more concerned about sulfate salts in the sea water precipitating out barium salts in the formational waters.

The converse has proved to be the case. Precipitation of barium sulfate is not a problem but corrosion protection is a major concern.

Initially no inhibitors were used. Within months the seriousness of the problem became evident, however, and it soon was established that the average corrosion rate was about 13 m.p.y. This applied to the shallow source wells as well as the injectors.

In the source wells the problem is being met in a variety of ways. The deep-well turbine pumps used are either Ni-Resist or SAE-63 bronze throughout. Wrought-iron pump columns were used but their poor performance has led to steel columns whose interior and exterior are coated with a baked-on phenolic plastic. In some of the more recent wells, concrete liners are used in place of steel.

To protect the high-pressure injection lines and casing in the injection wells, inhibitors are depended upon rather than use of noncorrosive materials. Chemicals tried earlier included arsenic compounds and mixtures of poly phosphates with sodium hydroxide and sodium hyperchlorite. Since 1955, however, the only chemicals used have been in the water-soluble organic cationic classification.

These amine-type compounds were first laboratory tested and then field tested to determine which were most effective. Their bactericidal properties were thoroughly evaluated as well as their ability to inhibit corrosion, since serious trouble is experienced with both sulfate-reducing bacteria and sulfide formers.

The inhibitor currently used (at a concentration of 20 p.p.m.) is believed to be holding the corrosion rate to a level that can be lived with. Approximate treating cost is 1.5 mills per barrel of injected water. The cost would run somewhat higher if the inhibitor were not purchased in bulk quantities.

Slant injection wells . . . As was the case in the drilling of most wells in the Long Beach Harbor area, most injection wells are slanted to the desired bottom-hole location from drill sites provided in the highly congested port area. This practice leads to some production problems but it also makes for a compact arrangement of surface equipment. Water-source wells, the injection plant, and the wellheads of the injection wells occupy only a few acres at most existing projects.

At most city plants operated by Long Beach Oil Development Co., brine from shallow wells is pumped to 3,000-bbl. tanks coated on the inside with a coal-tar product. Purpose of the tanks is to permit sand particles to settle out, plus the normal function of supplying working capacity.

Because of the lack of space for storage tanks, a different means of removing the sand is used at one of the newer plants. As an accompanying photo shows, two centrifugal desanders were installed at the plant site.

Horizontal quintuplex pumps, or similar vertical units, are used to inject the brine. Powered by 500 hp. gas engines, these units discharge to headers which serve the individual injectors. Fluid ends of the pumps are aluminum bronze with stainless-steel valves and seats. Either 4 or 5-in. solid ceramic plungers are used.

The pumps discharge into a two-pressure injection system; the 4-in. plungers at a maximum of 2,000 psi. and the low-pressure 5-in. plungers at a maximum of 1,270 psi. Injection wells are connected into the manifold system so that they can take water from either system.

The water is injected directly down the casing, using surface chokes to regulate the amount into each well. This varies from about 1,000 bbl. in some wells to as much as 35,000 bbl. daily in new peripheral Tar-zone wells. During test periods as much as 75,000 bbl. daily has been injected in some of these wells.

The city's contract operators not only are busily building injection plants but also they are drilling the injection wells needed. Six strings of tools are at work, including one rig near downtown Long Beach. The schedule set up for completing new injection wells, plus the number of wells which will be converted to injectors, calls for a total of 193 injection wells to be in operation at the end of this year. The total includes those of private operators as well as those on city properties.

Welded exchanger tubes gain favor

CARBON STEEL TUBING made by electric resistance welding is now used in many types of high-pressure heat exchangers and in boilers operating as high as 2,700 psi. Continued emphasis on quality control in manufacture of welded tubing by certain leading manufacturers has overcome the distrust built up in users' minds during World War II.

Lower cost . . . A spot check of a number of operating companies indicates that welded tubing has in general given satisfactory service, and is being given equal consideration with seamless on many new jobs. Welded-tube costs run from about 10% to as much as 50% lower in certain applications.

During World War II some mills (whose normal production was tubing for bicycle frames, bed frames, etc.) were asked by the Government to make heat-exchanger tubes. These mills did not employ high-quality weld control standards. As a result there were many premature failures.

New emphasis on quality . . . Today leading manufacturers insure that their welded tubing meets the ASTM specs, including the A 334 covering seamless and welded steel tube for low-temperature service and also the A 214 covering electric-resistance-welded tube for heat exchanger and condenser use.

An example of the rigid quality control employed is provided by the tubular-products division of Babcock & Wilcox at its Alliance, Ohio, plant. The control starts with the strip itself and continues through each step of tube manufacture. The control includes the destructive deformation tests called for specifically by the ASTM specs and some additional ones introduced by the manufacturer. Thus B & W uses ultrasonic inspection on 100% of the weld at production speeds.

Of course, application of ultrasonic inspection involves a number of problems of its own. Therefore it is not used as a criterion of acceptance or rejection but as an extra tool to alert the mill inspector and operator to the presence of possible defects. At the Alliance plant the immersed method is used; in this the ultrasonic crystal transducer and tube are both submerged in a fluid. Application of ultrasonic inspection is just one more technique employed to insure rigid quality control of welded tube.

Here are some tips on

Getting top performance from turbine meters

- These new meters have drawbacks, but under proper conditions will do a job unequaled by other methods. Velocity, viscosity, and temperature conditions must be carefully analyzed.

BY A. J. GRANBERG
President, Granberg Corp.

The name of A. J. Granberg has been linked with the science of metering petroleum products since 1917 when he marketed the first petroleum truck meter and pioneered state legislation making delivery by meter a legal method of dispensing petroleum. He has been associated with the development and manufacture of meters and metering systems since that time and has developed numerous patented meter designs. He recently introduced a 20-in. dual-rotor 20,000-bbl. per hour turbine meter for measuring petroleum.

THE ENTHUSIASM over turbine meters throughout the oil industry is well justified, but a word of caution is in order. A turbine meter is far from a cure-all. A few new and recent models appear to have made some headway in overcoming the problem of viscosity and velocity effect on turbine meters in measuring various petroleum products with different viscosities.

But it is not my intention to minimize the value of turbine meters; far from it—a turbine meter has exceptional qualities in accuracy and consistent performance. It is low in pressure drop, low in maintenance cost, and not affected by normal conditions of foreign matter or waxing.

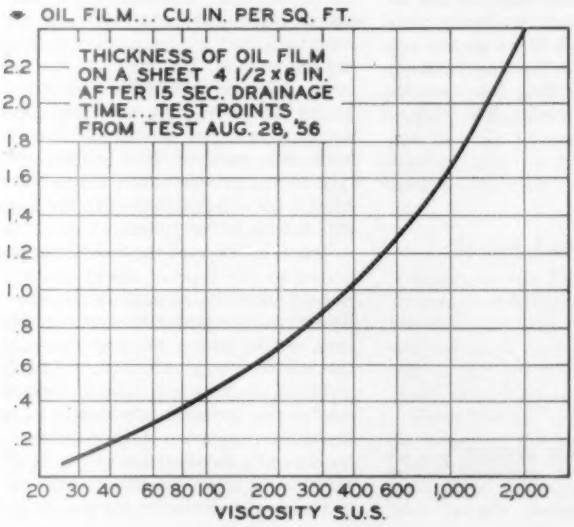
In order to obtain these qualities with a turbine meter, one must carefully analyze the liquid to be measured as to viscosity, velocity, and temperature conditions. Viscosity chart, Fig. 1, was obtained by submerging a turbine blade in liquids of different viscosities and weighing the blade to determine the thickness of the film adhering to the blade. This chart illustrates the tendency of building up or adding to the thickness of a turbine blade by liquids of different viscosities.

A liquid turbine, such as is used in meters, is like a screw going through the liquid, as a cork screw through a cork. Liquid measuring depends on the angle of the blades which control the revolution of the rotor, which, in turn, is transmitted to the register or counter.

The area of the rotor chamber, less the thickness of the rotor blades, controls the cubic displacement, or the amount of liquid passing through the meter for each revolution of the rotor. Therefore, a film on the blade that would add to the thickness of the rotor blade would reduce the area between the rotor blades. The amount of liquid flowing through the meter per revolution of the rotor would thereby be reduced, producing a short measure.

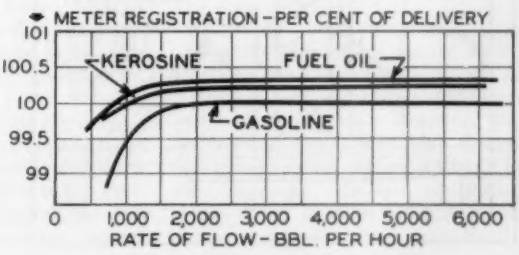
Fig. 2 further illustrates this point. This chart is made from actual tests where the same turbine meter was used on three products of different viscosities: (1) aviation gasoline at a viscosity of 29 S.U.s., (2) kerosine at 45 S.U.s., and (3) diesel oil at 53 S.U.s. The difference in meter readings, as shown, illustrates the effect of the blade film from the three different viscosities. This effect will be greatly magnified when operating on fluids of greater viscosity, as illustrated by the film-thickness chart, Fig. 1.

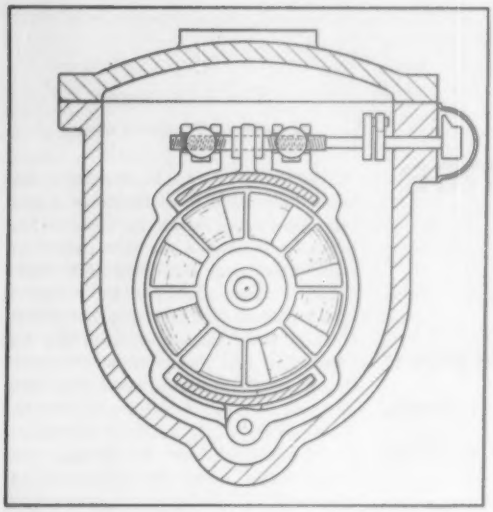
The blade film, as indicated on Fig. 1, is the film thickness under no-flow conditions. Since flow or velocity



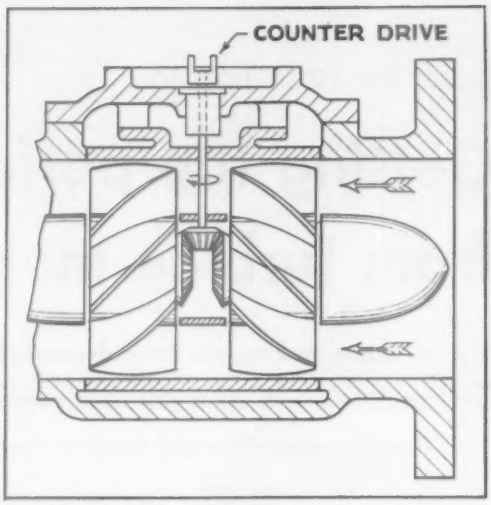
LIQUID BUILDUP on turbine blade increases with viscosity. Fig. 1.

EFFECT OF BLADE FILM from three products of different viscosities. Fig. 2.





ADJUSTABLE VISCOSITY brake is used to overcome velocity and viscosity problems. Fig. 3.



DOUBLE TURBINE METER has two rotors with right and left-hand vanes. Fig. 5.

effect of the liquid going through the meter will alter the thickness of the film on the turbine blades, the chart cannot be used to determine the meter factor for different viscosities, unless the operating velocity is known and its effect on the film of the particular product going through the meter is also known.

Velocity Effect

The effect on blade-film thickness by velocity from low-viscosity liquids such as gasoline is so small that from an accuracy standpoint it can be discounted completely. The film from such liquids is so light that the reduction of film by higher velocity is not detectable under normal operating conditions.

On the other hand, a liquid having a viscosity of 1,000 S.U.s. flowing through a turbine meter at the velocity of 3 ft. per second will have a heavy blade film that will be constant for that particular velocity. As the velocity is increased up to 15 ft. per second, the thickness of the blade film will decrease in proportion.

Under this condition, the turbine meter will deliver a short or a smaller gallon at its minimum rated flow than it does at its maximum rated flow. Thus, the film reduction on the turbine blades is in direct ratio to the velocity increase.

The ideal condition for turbine meters operating on viscous oil would be a constant velocity with the minimum variation of viscosity. Since ideal conditions do not always present themselves in standard methods of operation, the manufacturers of turbine meters have attempted to overcome this problem of viscosity and velocity. They have used methods ranging from electronic devices to mechanical braking or retarding the rotor, thereby attempting to compensate accuracy by means of slippage.

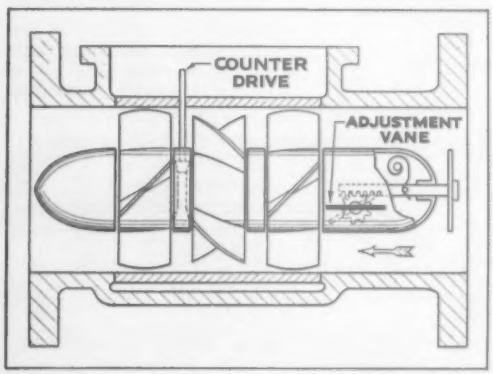
Corrective Measures

Fig. 3 is an illustration of an adjustable viscosity brake being used for this purpose. A brake of any sort on the rotor of a turbine meter, in fact, would be nothing but metering by slippage or bypassing. The purpose of a viscosity brake is to create a drag on the rotor, permitting more liquid to pass per revolution of the rotor. As the viscosity increases, so does the braking power and the slippage.

This type of measuring by slippage must be confined to one viscosity and one velocity or flow rate. Increasing the speed or the rate of flow will increase the braking power of the viscosity brake, increasing the slippage and delivering a larger gallon; at the same time the effect of the blade film being reduced at higher velocity will in itself, produce a larger gallon passing through the meter. Maintaining accuracy in this type of construction becomes more or less a matter of juggling.

Fig. 4 is another method of approaching the problem of viscosity and velocity effect on the accuracy of turbine meters. The purpose of the three rotors is to reduce the number of blades for each rotor and still have sufficient driving power for driving the counter. The effect of the viscosity film on the rotors having 4 blades would be only one-fifth compared to a rotor having 20 blades. With this reduced film effect, this type of construction would appear to have a 20% advantage over the regular full-blade-type rotor.

The remainder of the correction required in this type of construction is accomplished by an adjustment vane. By means of a gear and a rack on the stem of the piston head at the inlet side of the meter, the liquid velocity produces a forward tension, which rotates the movable adjustment vane in direct proportion to the velocity. By changing the direction of the liquid entering the rotor, the adjustment vane increases and decreases the power ap-



THREE ROTORS are another approach to velocity and viscosity problem. Fig. 4.

THE AUTHOR beside a 20-in. duo-rotor turbine meter at the test station of his Oakland, Calif., plant. This 20,000-bbl. per hour meter was recently shipped via air cargo to B-I-F Industries, of Providence, for incorporation into a proportioning unit for blending oils in ship loading.

plied by the liquid to the rotor depending on the angle of the adjustment vane.

This method of adjustment will overcome or balance the film reduction on the turbine blades at various velocities and produce a straight-line accuracy of the meter over the entire flow range. Whereas the triple-rotor design minimizes the effect of different viscosities, it is not a cure-all. This type of construction will accurately handle the variation in viscosity due to temperature changes, but its accuracy is still confined to one type of oil.

Temperature Control

Excessive viscosity variation, whether it be due to temperature or product variation, is to be avoided when using turbine meters. Heavy oils, being of high viscosity, should be kept under controlled temperature limits as determined by the over-all accuracy required.

Turbine meters are limited as to driving power required for driving various types of counters or recorders. This is particularly true at low speeds approaching minimum capacity of the meter. This condition is greatly emphasized in single-turbine-type meters. At maximum capacity nearly all types of turbine meters could furnish sufficient driving power for the average counter, but this would limit the use of a turbine meter to full capacity only and nullify its use for other flow rates.

This lack of driving power is supplemented by the use of electronic readout equipment. The turbine rotor serves only as a revolution indicator or impulse generator and the revolutions of the rotor are transmitted electrically through an amplifier system to digital counters or other types of readout devices.

This method, however, is limited to such installations where electric power is available. It is not always the most desired system, particularly in out-of-the-way places, since failure of electric power would be a meter failure. Many users object to this type of installation because of high initial cost as well as complex maintenance problems.

Double-Turbine Design

Referring to Fig. 5, we have a schematic drawing of a double-turbine meter having two rotors with right and left-hand vanes. This construction will supply sufficient power for the direct driving of a digital counter.

The right and left arrangement of the vanes in the turbine is the main feature in supplying power at low flow rates. This is best explained by the fact that the two rotors are geared together to a common counter drive shaft. If the two rotors are run separately, independent from each other, the second rotor will run faster than the first.

The same condition is also true when the flow is reversed. The first rotor, regardless of how free from load, has a tendency to turn the liquid in the direction of the blades. The liquid then will enter the second rotor at a sharper angle, increasing the speed and driving power of the second rotor. When geared together, they sustain a uniform driving power over the full flow range of the meter. This feature is responsible for the straight-line accuracy indicated on Fig. 2.

Analysis . . . With turbine meters the normal procedure in selecting a meter may well be reversed. The operating conditions are all-important and must be accurately rated.

Describe the operating conditions as outlined later. Evaluate the answers and, with the description of the various models of meters, select the meter that is best for the job.

1. Viscosity at 60° .....
2. Viscosity at minimum temperature range .....
3. Viscosity at maximum temperature range .....
4. Operating range minimum .....
5. Operating range maximum .....
6. Operating velocity minimum .....
7. Operating velocity maximum .....
8. Blade film at minimum velocity
   Estimated according to velocity .....
9. Blade film at maximum velocity
   Estimated according to velocity .....
10. Accuracy required at minimum range .....
11. Accuracy required at maximum range .....
12. Velocity correction required .....
13. Counter or readout equipment required .....
14. Mechanical counter drive .....
    Electric .....
15. Type of meter selected .....
16. Pipe size .....
17. Pressure .....
18. Flange .....
19. Material .....

Operating conditions are not always ideal and must at times be altered or controlled to comply with conditions necessary for accurate metering. Under proper conditions the turbine meter will do a job unequaled by other methods. The use of turbine meters today is in its infancy as the steam turbine was some years back.

CEMENTING TRUCKS displaced an equal amount of 21.5-lb. mud into the wellhead as the 1¼-in. tubing was stripped from the well. Trucks were also used to pretest all blowout preventers and valves to 11,500 psi. before job started.

How Sinclair stripped tubing from 8,100-psi. well

• Well was under control at all times and there was little unforeseen difficulty as 13,000-ft. string of 1¼-in. tubing was stripped from a South Louisiana well.

BY ED McGHEE
Drilling Editor

AS FAR as the records show, until a few weeks ago, no one had ever stripped tubing out of a wellhead having more than about 5,000-psi. pressure. Anyone who has witnessed a tubing-stripping job will testify that working against 5,000 psi. is no job for the inexperienced.

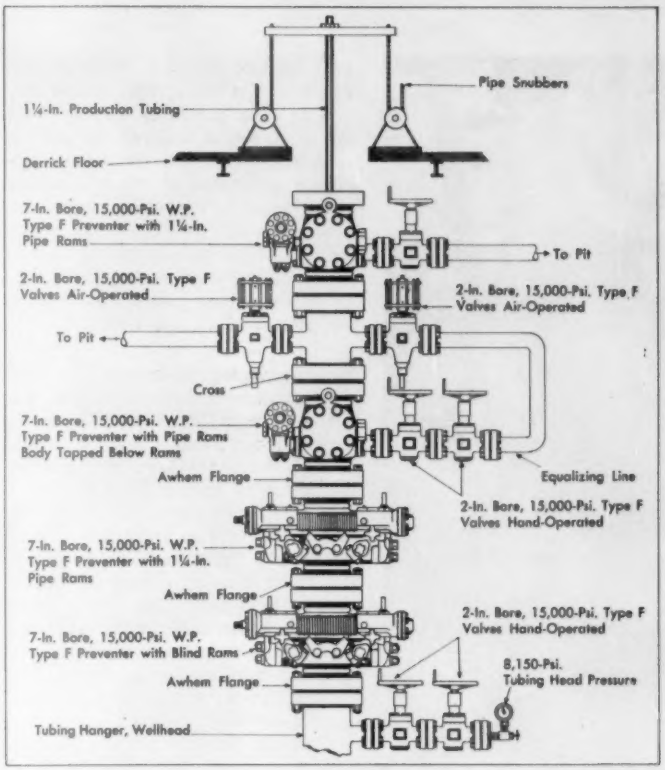
However, Sinclair Oil & Gas Co. has pulled a string of 1¼-in. tubing from a South Louisiana well which had more than 8,000 psi. on the wellhead at the time.

To the credit of Sinclair and of the companies which supplied equipment and services for the operation, there was very little unforeseen difficulty on the job. The well was under control at all times; there were no equipment failures under pressure and there was no undue loss of time. All in all, what could have been an extremely hazardous and difficult stripping job was done smoothly and in a relatively short time. Cost of the operation, though high by most standards, is certainly low when compared to what a blowout resulting from a poorly planned operation might have cost in human life and property.

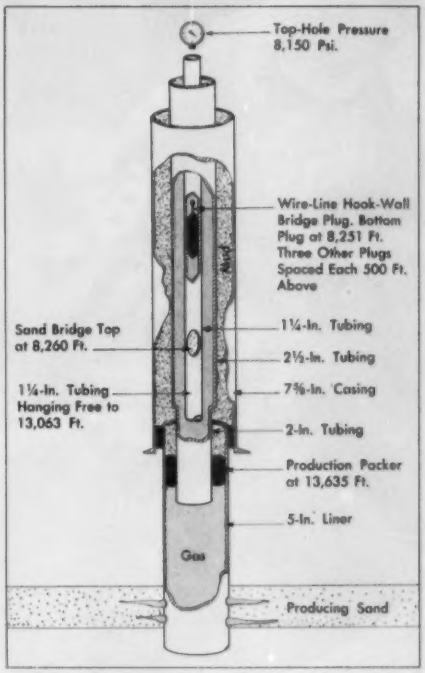
Tubing sanded up . . . The well, Sinclair's 2A Peltier Farms near Raceland in La Fourche Parish, had been recently completed and flowed through 1¼-in. tubing. This string of pipe hung out of the tree to a depth of 13,063 ft. Also in the well was a string of 2½-in. tubing set on a packer at 13,635 ft. (Actually, the lower end of this second string was 2-in. because the packer was inside a deep 5-in. liner below a 7⅝-in. oil string).

While producing on test, the 1¼-in. tubing became plugged by sand from the well. Repeated attempts to remove the sand failed. Shut-in tubing-head pressure was 8,150 psi.

A wire-line mechanical perforator was lubricated into the production string and run down to the top of the sand bridge. It was planned to punch holes in the 1¼-in. pipe so that heavy mud could be circulated down the well to kill it. However, these efforts failed. The inside diameter of the tubing so restricted the size of the perforating tools that they were too light to make the needed holes.


Pipe Snubbers
1¼-In. Production Tubing
Derrick Floor
7-In. Bore, 15,000-Psi. W.P. Type F Preventer with 1¼-In. Pipe Rams
To Pit
2-In. Bore, 15,000-Psi. Type F Valves Air-Operated
2-In. Bore, 15,000-Psi. Type F Valves Air-Operated
To Pit
Cross
7-In. Bore, 15,000-Psi. W.P. Type F Preventer with Pipe Rams Body Tapped Below Rams
Equalizing Line
Awhem Flange
2-In. Bore, 15,000-Psi. Type F Valves Hand-Operated
7-In. Bore, 15,000-Psi. W.P. Type F Preventer with 1¼-In. Pipe Rams
Awhem Flange
2-In. Bore, 15,000-Psi. Type F Valves Hand-Operated
7-In. Bore, 15,000-Psi. W.P. Type F Preventer with Blind Rams
8,150-Psi. Tubing Head Pressure
Awhem Flange
Tubing Hanger, Wellhead

STRIPPING ASSEMBLY for the record job. Top two preventers served as the working units, opening and closing alternately as couplings of the 1¼-in. string were pulled to the surface.


Top-Hole Pressure 8,150 Psi.
Wire-Line Hook-Wall Bridge Plug. Bottom Plug at 8,251 Ft. Three Other Plugs Spaced Each 500 Ft. Above
Sand Bridge Top at 8,260 Ft.
1¼-In. Tubing
2½-In. Tubing
1¼-In. Tubing Hanging Free to 13,063 Ft.
7⅝-In. Casing
2-In. Tubing
Production Packer at 13,635 Ft.
5-In. Liner
Gas
Producing Sand

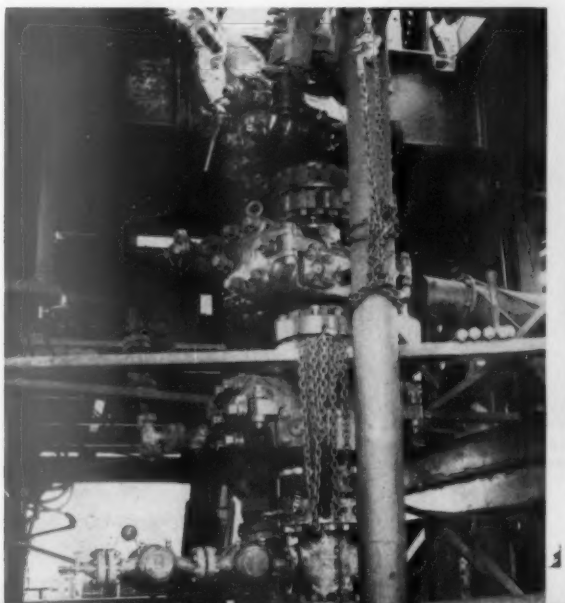
SIPHON STRING had sanded up and had to be pulled from the well. Attempts with mechanical perforators to make holes in the string failed. Thus, it wasn't possible to circulate mud to kill the well.

The only course left was to strip out the tubing under pressure.

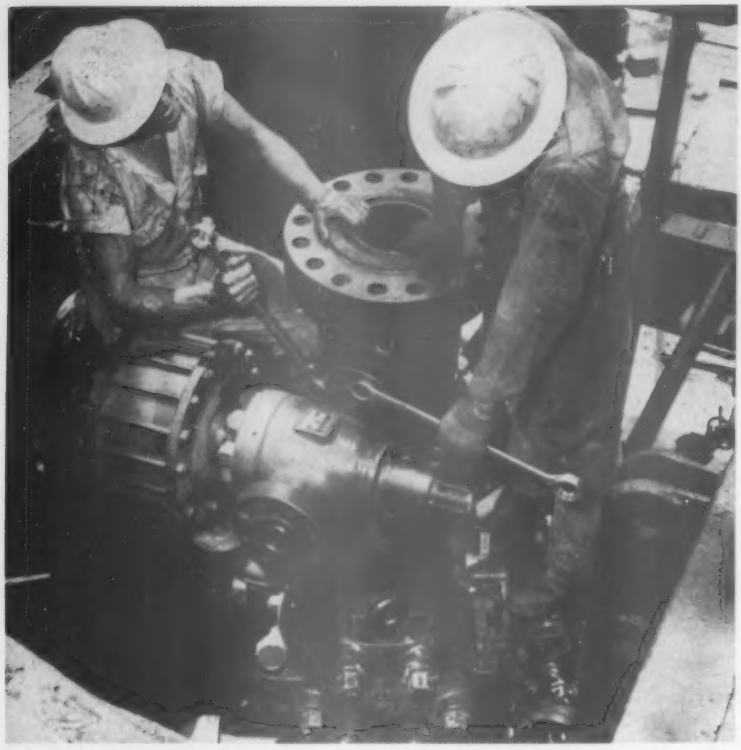
Set wire-line plugs . . . First step in the stripping job was to make certain that there'd be no blowout through the 1¼-in. as it was being pulled. Although the sand bridges completely plugged the string, they couldn't be depended on to continue this while the tubing was jarred about in the stripping operation. If the 1¼-in. weren't effectively plugged, the crew would have to rely on inside blowout preventers in case the sand bridges came loose.

Otis Engineering Corp., which supervised the stripping operation, picked hook-wall wire-line plugs to stopper the 1¼-in. string. Four were run: one just above the top of the sand bridge at 8,251 ft. and three others spaced at 500-ft. intervals up the hole. These plugs actually act as

LOWER THREE BLOWOUT PREVENTERS and the cross were located below the substructure. Wellhead stack protruded up through the derrick floor. After original installation, none of the flanged connections had to be retightened under pressure.



AS JOB PROGRESSED preventer rams were operated to pass tubing couplings through. Hydraulic pressure in the preventer operating system was only 500 psi. Pipe was not stripped back into the hole as well was dead, full of 21.5-lb. mud.



AIR-OPERATED VALVE was installed to equalize pressure across rams of top two preventers. Although there was as much as 8,150 psi. well pressure and 11,500 psi. test pressure on these valves, they operated with only 180 psi. air pressure.

back-pressure valves and each was set to hold a differential of 2,000 psi. Thus, all four together would hold back the entire 8,000-psi. well pressure below.

With the plugs in place, the top of the 1¼-in. tubing string was bled down. The plugs held and there was no gas escaping out of the tubing after initial bleedoff. Then the 1¼-in. tubing head was removed and a 7-in.-bore Cameron Type F 15,000-psi. working-pressure blowout preventer was quickly placed on the tree.

This first preventer carried blind rams. It would seal off the hole in case of any of the following unexpected circumstances: the sand bridges came loose and the tubing plugs failed before the stripping operation began: the 1¼-in. string was pulled in two, dropped, or parted during pulling; the entire string was pulled and pressure still remained on the wellhead.

PACKING ELEMENTS in preventer rams were adapted to accept special inserts, visible in top ram. Thus, as stripping caused preventer wear, inserts could be changed without changing the entire ram packing.

Install stripping equipment . . . With the well now completely closed in at the surface, all was ready to install the equipment that would be needed to strip out the 1¼-in. tubing string. Three more Cameron Type F preventers, similar to the first except that all carried 1¼-in. pipe rams, were placed on the tree. The lowest of the three was to remain in reserve and be used only when it was necessary to change rams in the other preventers or in case of an emergency. The top two would be the working preventers: the rams in them could be changed easily.

Between these preventers was installed a cross to aid in equalizing the pressure across the rams in each. In addition the cases of both top preventers were equipped with side outlets below the rams. These side outlets also aided in equalizing pressure.

Onto each side outlet of the cross was flanged a Cameron 2-in.-bore Type F 15,000-psi. working-pressure air-operated gate valve. (See The Oil and Gas Journal, September 29, 1958, p. 57, for details of construction of both the Type F valves and the Type F preventers.)

Other manually operated Type F valves and lines completed the wellhead stack.

On the derrick floor Otis installed its pipe snubbers which would prevent the 1¼-in. string from blowing out of the hole.

With all equipment in place, cement squeeze trucks pressure-tested all the surface equipment and connections to 11,500 psi. All equipment was rated to 15,000 psi., but it was impossible to test to this value because the collapse pressure on the 1¼-in. pipe had been calculated at near the 11,500-psi. mark. All the equipment passed the pressure test. The blowout preventers opened in 3 seconds and closed in 6 seconds against the 11,500-psi. trapped test pressure with only 500 psi. in the hydraulic operating system. Performance was equally good later on against as much as 8,400-psi. dry gas pressure during actual stripping operations.

The 15,000-psi. Awhem flanged connections used throughout the pre-

PIPE-SNUBBING EQUIPMENT on derrick floor. Weight of string was more than upthrust caused by well pressure throughout job. Snubbers had to be kept in place in case tubing parted.

venter stack not only passed this original pressure test, but also held pressure-tight during the remainder of the job without any further tightening. These connections use a self-sealing, pressure-energized design similar to the BX ring gasket (OGJ, April 8, 1957, p. 115).

Stripping begins . . . With all equipment tested leaktight, the 1¼-in. string was picked up and started out of the well. The top two preventers were used alternately to pack off around the string. The string was pulled until a connection (Hydril CS) between joints had risen to the top; and the preventers were operated alternately until the connection was passed through.

For this operation, the regular preventer rams packing had been adapted to accept small inserts which sealed around the 1¼-in. pipe. These inserts took almost all of the wear and could be changed without changing the entire ram packing. The inserts first had to be changed after only six joints of tubing had been pulled from well. Only twice more was it necessary to change out the inserts.

As the pipe was pulled out of the hole, cement squeeze trucks pumped 21.5-lb. per gal. mud into the annulus between the 1¼ and 2½-in. strings. Volume of mud pumped in was carefully measured to be equal to the volume vacated by the amount of 1¼-in. pipe pulled. As mud was pumped in on the first several joints, wellhead pressure rose to its highest value, about 8,400 psi.

Each time before the rams were opened during stripping operations, pressure was equalized across them. This was done by working the air-operated valves on the equalizing line and on the line to the burn pit. Although these valves probably operated more than 500 times each under pressures up to 8,400 psi., there was no sign of leakage or seat cutting on either. Moreover, they operated quickly with only 180-psi. air pressure on the operator. One man had no difficulty in opening or closing the hand-operated valves under the extreme pressures.

The pipe-snubbing equipment was kept on the 1¼-in. string as the first several thousand feet were pulled. Weight of the string was enough that the well pressure could not blow the entire string out of the hole. But, the snubbers were necessary to secure the string should it break.

Plugs, sand removed . . . The topmost of the wire-line plugs came to the surface when some 6,750 ft. of the tubing had been pulled. This plug and the three below it were removed one at a time as each came to the surface. To pull a plug, a pulling tool was lubricated into the top of the 1¼-in. string. This tool first released the 2,000 psi. trapped behind these back-pressure plugs. When all gas behind the plug had been bled off, the plug itself was pulled.

Each of the four plugs was removed in its turn. When the last was out, the sand bridge below apparently was still intact as the 1¼-in. tubing remained plugged tight. This meant that a valve had to be installed on the top joint of the 1¼-in. pipe as the string was pulled. This valve prevented a blowout through the 1¼-in. pipe when the last sand-plugged joint was pulled.

As each new joint came to the surface, it was carefully drilled into by Otis' pressure-tapping process. When tapped, the joint was bled off if possible. If it did bleed off completely, the connection was backed off and a valve installed on the joint, still hanging in the slips.

At last, the pressure tapping showed that all of the sand-plugged tubing had been pulled. This meant that it was now possible to circulate down through the 1¼-in. tubing to kill the well with mud.

Mud reduces pressure . . . As the stripping job had progressed, the heavy mud being pumped in had begun to show its effect. From its high to 8,400 psi., wellhead pressure had dropped gradually. Only about 4,000 psi. remained when the sand-plugged tubing had all been removed and circulation became possible.

The high-pressure cementing pumps began pumping the 21.5-lb. per gal. mud down the 1¼-in. string. Gas pressure was bled off the 2½-in. string. After many hours of pumping and bleeding, the well was killed, and the 1¼-in. string could then be pulled out of the hole without stripping.

The snubbing equipment was partially rigged down but was left so that it could be quickly placed in operation should the well kick.

The complete string of 1¼-in. tubing was pulled from the well. Then, with a "stinger" of ¾-in. pipe open-ended on the bottom, the 1¼-in. pipe was run back into the well. The pipe was run completely to bottom and sand washed from the well. Circulating pressure on the heavy mud at this time rose as high as 7,500 psi.

To complete this record-stripping operation, the 1¼-in. string was rerun and the mud circulated out of the well.

Here's a big rig for deep, deep

IN WEST TEXAS, seemingly, 20,000-ft. plus wells are becoming commonplace. Of course, these depths are so far beyond the range of ordinary drilling equipment that they require rigs specifically designed for such work. To answer the needs for rigs in the extreme-depth class, Sharp Drilling Co., Midland, Tex., has assembled a rig that ranks as one of the largest of land-based units.

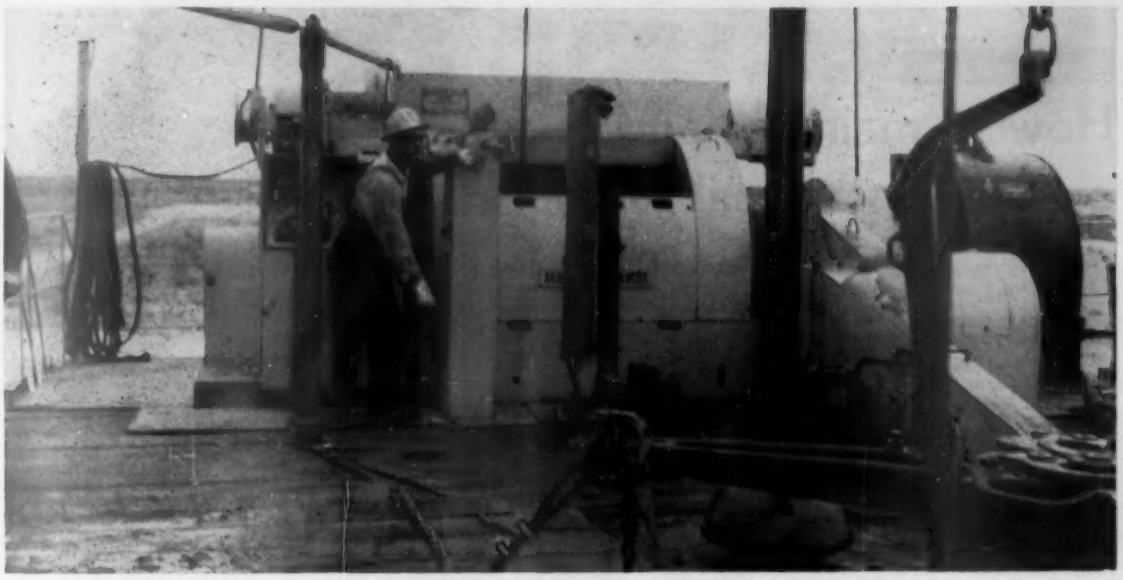
Sharp's new Rig 43 only recently rigged up and is now finishing a "shallow" 13,000-ft. well as a shakedown. The new rig has four features which will make its task of drilling deep wells easier:

- The extra-high substructure leaves ample room for three ram-type and one bag-type blowout preventer even after several casing strings have been set.
- Arrangement of the substructure allows room for a boom truck to back under the floor to help in handling preventers and other wellhead equipment.
- A three-speed transmission on the pump drive makes it possible to drill long sections of hole without changing pump liners.
- Pump power is high, allowing high circulation rates for drilling large-diameter shallow hole and allowing high pressure for good jet hydraulics at greater depths.

Mechanical drive . . . Sharp Drilling picked mechanical drive for the new rig instead of electric drive which has been common to many recent big rigs. Sharp feels that it will be necessary to move the big rig so seldom that any rigup advantage of electric drive would be lost in its greater cost.

Power for drilling comes from three V-12 Waukesha diesel engines, each rated at 1,000 hp. intermittent for hoisting and at 850 hp. continuous for pumping. These engines sit on an 8-ft.-high substructure, intermediate

PUMPING plant is biggest in West Texas area. Pump in foreground, a B-1640, is 2,000-hp. model. Far pump, GI-600, is 800-hp. model.



DRAW WORKS on Sharp's new Rig 43 can handle 4½-in. drill pipe as deep as 25,000 ft.

drilling

between the pumps which are at ground level and the draw works which is atop a 25-ft. substructure.

The main drive to the draw works is inclined at about a 60° angle as it goes from the lower substructure to the taller. Length of the drive is such that a countershaft is installed at about the halfway point.

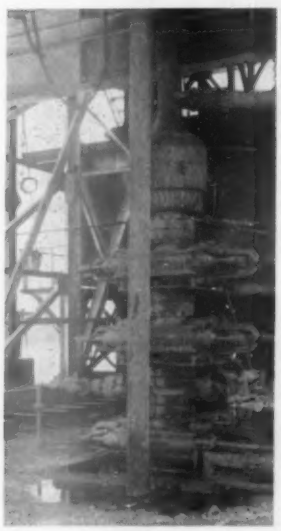
At the other end power train, there is a three-speed transmission for the pumps, both of which are V-belt driven off the rear end of the compound. With engines at governed speed, this transmission will drive the pumps at about 73 s.p.m. in high gear, at about 50 s.p.m. in intermediate, and about 35 s.p.m. in low. Advantage of the pump-drive transmission is, of course, that it allows operation at a wide range of volumes and pressures with the same liner size. The hole can be spudded and carried quite deep without changing liners.

Substructure needs no help . . . The 25-ft. substructure of Rig 43 leaves ample room for any number of blowout preventers that might be needed in the deep drilling of today, tomorrow, or the day after. There should never be need to compensate for inadequate substructure height by putting the wellhead in a gas-collecting cellar or by building subbases for the substructure itself.

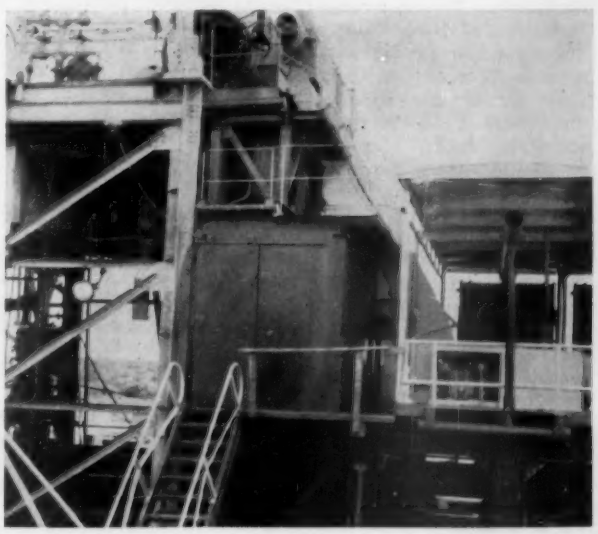
Moreover, the tall substructure is designed for ease in handling the equipment below it. On the V-door side there is a big unrestricted opening through which a large boom truck can back with plenty of room on both sides and above.

Rig and pumps . . . Draw works on Sharp's Rig 43 is a Bethlehem 1013, which should be capable of handling 4½-in. drill pipe to depths of 25,000 ft. Pumps are a Bethlehem B-1640, rated as high as 2,000 hp. with maximum speed and liner sizes, and a Bethlehem GI-600, an 800-hp. model which is itself quite large by West Texas standards.

The derrick is a 140-ft. model with 30-ft. base and 1,300,000-lb. gross capacity.



EVEN with three ram-type and one bag-type preventer, there is plenty of working room under the floor. Here, well is drilling "shallow" portion of 13,000-ft. hole.



ENGINES are on 8-ft. substructure to simplify rigup. Draw works is on 25-ft. substructure, so main drive is inclined at about 60° angle. Countershaft is used in middle of the drive.

The

FOREMAN'S PAGE

PART 5—SAFETY AND BLOWDOWN FACILITIES (CONCLUSION)

How to maintain and operate industrial furnaces

THE SAFE operation of industrial furnaces requires alert attention and a thorough knowledge of certain precautionary procedures on the part of the personnel having charge of them.

When operated in the proper manner, the furnace serves to burn a fuel-air mixture which if not satisfactorily controlled could result in explosions with resultant serious injury to personnel and destruction to facilities. It is important, therefore, that everyone concerned with the operation of furnaces in the refinery be well acquainted with the safe operating procedures which are outlined herein.

Fundamental Precautions

Some fundamental precautions apply in the operation of all furnaces.

Lighting burners . . . In all cases a properly designed torch should be used for lighting furnace burners. The burner should never be lit off an adjoining burner or off a hot wall of the firebox.

Steaming and ventilating firebox . . . A torch should never be inserted into a furnace until the firebox has been properly ventilated through steaming or by operating draft fans. Proper steaming shall be considered as consisting of opening steam into the firebox at maximum rate for at least 15 minutes.

If the furnace operates under mechanical draft, the operation of the draft fans for 15 minutes may be substituted for the steaming-out period. Ventilating by either of the above two methods is necessary both before lighting a cold firebox and relighting a firebox in which the burners were in some way extinguished during operation.

Burner torch . . . A torch of suitable type should be provided at each furnace for use in lighting the burners. The torch may be either of the wick type for use with oil fuel or of the pipe type connected to a gas fuel supply. With the former type, an asbestos material should be used for the wick and a heavy oil should be used for the fuel. A mixture of equal parts of fuel oil and gas oil or domestic gas oil alone is recommended.

This material taken from process-training-program manual, Baton Rouge, La., refinery of Esso Standard Oil Co.

Personnel authorized to operate furnace . . . The various tasks in connection with the operation of a furnace should in the normal case be performed only by the furnace fireman assigned to the job. In the event of an emergency or in some other situation requiring additional help, the head operator might delegate other members of the operating force to assist the fireman.

Gas-Fired Furnaces

For lighting furnaces with a cold fire box, do the following:

1. Check to see that all blanks are removed from the fuel-gas lines and that the block valves at the burners, as well as the block valve in the laterals to the furnace are closed.
2. Check fuel-gas pressure to see that it is satisfactory.
3. Check fuel-gas separator and drain out any liquid that might be present.
4. Open all air registers and dampers preparatory to ventilating firebox.
5. Open steam wide into firebox for at least 15 minutes. Where draft fans are present, operate fans for at least a like period.
6. Open block valve in fuel-gas lateral to furnace.
7. Adjust air registers or air intakes to burners to proper setting for lighting burners.
8. With furnaces that operate with forced draft fans, it is also important that a check be made to be assured that a draft (negative pressure) exists in the firebox before attempting to light any burners.
9. Open each burner valve in turn and light burners successively.
10. If the first burner fails to catch after a reasonable time, the torch should be withdrawn and the fire box should be again ventilated following the procedure described under 4 and 5.

For handling burners in operation, do the following:

1. The fireman should regularly examine the firebox interior to insure that all burners are operating properly.
2. Adjustments should be made to the air-gas mixture as necessary to insure safe and economical operation.
3. If one or more burners go out but others remain lit, the fuel gas should immediately be shut off to all those that are out. They should then be relit progressively, using a torch.
4. If all of the burners in a firebox or in one section of a firebox go out, the total flow of gas to that section should be immediately stopped by closing the block valve in the fuel gas lateral. The furnace should then be steamed or the draft fan allowed to operate for a period of 15 minutes, after which the furnace should be relit progressively.

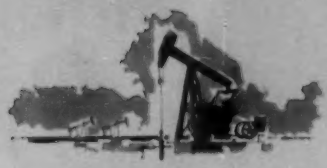
In no case should an attempt be made to relight the burners off a hot wall of a firebox. Also, it is imperative that the 15 minute ventilating period be followed before endeavoring to relight any burners in the event that all of the burners in a section of the firebox are extinguished.

When shutting down burners:

1. The fires should be progressively reduced in intensity by adjustments of fuel-gas control valve or lateral block valve. When the fires are low enough, the fuel-gas supply may be completely stopped by successively closing the burner block valves.

Before closing the last burner valve, however, the lateral block valve should be closed and the pressure entrapped in the lateral line allowed to be expended by burning the gas at the last burner. The last burner valve should then also be closed after which blanks can be installed in the lateral line as necessary.

2. Handles and valve wheels should be in place on all valves in the fuel-gas system to insure that the burners can be shut off immediately if it should be required.



PICK ANY WELL YOU'LL PUMP IT BETTER WHEN YOU Specify

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

PICK CONTINENTAL SUCKER RODS

Let your C-E man explain the many metallurgical advantages of Continental sucker rods. He knows how the chemical properties of the rods react to the specific fluids being pumped in your area. He can show you how the use of a certain Continental rod grade as well as rod string design, subsurface pump design and well counterbalancing will greatly affect the life of your sucker rod string. This first hand information is invaluable. So, specify a Continental sucker rod . . the *better* rod, in four grades to meet all well conditions.

Continental-Emsco's *complete supply system* provides local sucker rod stocks near your lease . . backed up by large, complete stocks at C-E's modern Garland, Texas sucker rod plant.

CONTINENTAL SUCKER ROD COUPLINGS

Each Continental coupling is 100% inspected before leaving the plant to insure unexcelled performance. Exteriors are hardened against wear while interiors remain ductile to absorb shock loads.

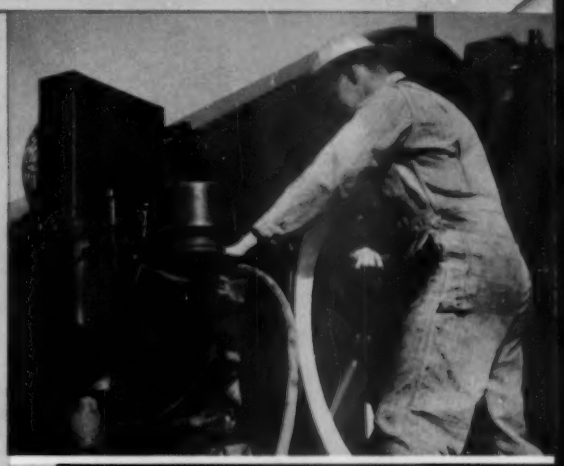
AND D+B SUBSURFACE PUMPS

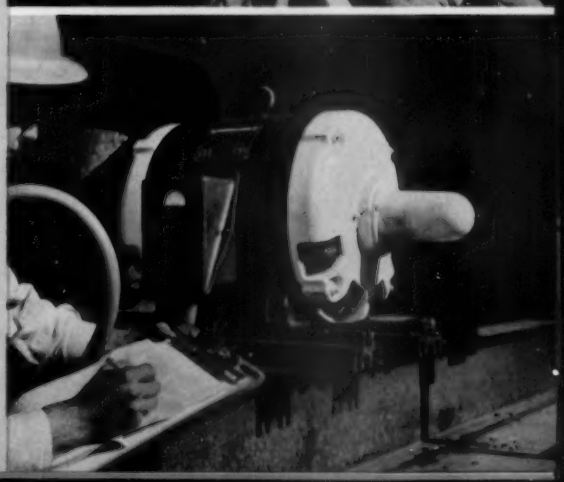
There's a combination to pump every one of your wells

D+B subsurface pumps are made to API specifications. This means a great savings for you when special pump types are needed to produce large volumes, pump two or three zones, pump gaseous or corrosive fluids. Such D+B pumps are assembled with standard API parts from your inventory, plus only a few special parts. Get acquainted with the flexible D+B subsurface pump line of 37 types with over 700 variations. See how the competitive priced D+B pumps

PICK YOUR LOWEST COST POWER

Where does your profit advantage lie.. pumping with gas or electricity? Get the advice of your C-E man. He sells the only two unit pumper prime movers *originally* designed for oil field pumping: C-E Engines.. always in a class by themselves for superior performance in producing fields of the world; and C-E Green Triangle Electric Motors.. the *common sense* motor that takes the guesswork out of well counterbalancing for lowest possible electric cost and less wear on all pumping equipment. Your C-E man is never biased.. *both motor and engine* are of C-E design.





PICK CONTINENTAL SUCKER RODS

AND D+B SUBSURFACE PUMPS

There's a combination to pump every one of your wells

D+B subsurface pumps are made to API specifications. This means a great savings for you when special pump types are needed to produce large volumes, pump two or three zones, pump gaseous or corrosive fluids. Such D+B pumps are assembled with standard API parts from your inventory, plus only a few special parts. Get acquainted with the flexible D+B subsurface pump line of 37 types with over 700 variations. See how the competitive priced D+B pumps

PICK A NEW CONTINENTAL-EMSCO UNIT PUMPER . . DESIGNED TO API's SUGGESTED STANDARDS

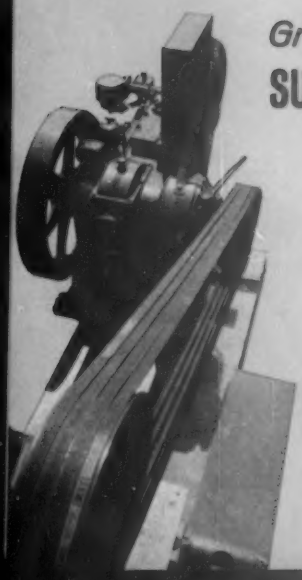
New and completely designed to API specifications, C-E unit pumpers give you (1) improved torque factor to cut gas and electricity costs and (2) more flexible well load rating to meet current and changing conditions. This new design, combined with C-E field proven features, meets rigid performance standards through exhaustive scientific tests.

BE SURE . . SPECIFY C-E UNIT PUMPERS *Engineered to do better . . not just built*

PICK CONTINENTAL SUCKER RODS

DON'T PICK JUST ANY ACCESSORY

standardize on the finest from C-E



Green Triangle

SUPER V-BELTS

These belts are sold in matched sets to assure uniformity in length, diameter, thickness, material and freshness. Each set *pulls as a unit* for maximum power transmission and evenness of wear for months of operating life. New Green Triangle Super V-Belts deliver 40% more horsepower . . *no extra cost.*

Continental API

POLISHED RODS

Five Continental polished rods are manufactured, ranging from HEATREAT, a high-grade medium carbon piston steel to MONEL for extreme corrosive conditions. Tensile strength ranges from 90,000 to 110,000 psi. This wide choice makes it easy to meet your pumping problems with Continental polished rods . . . the finest available.

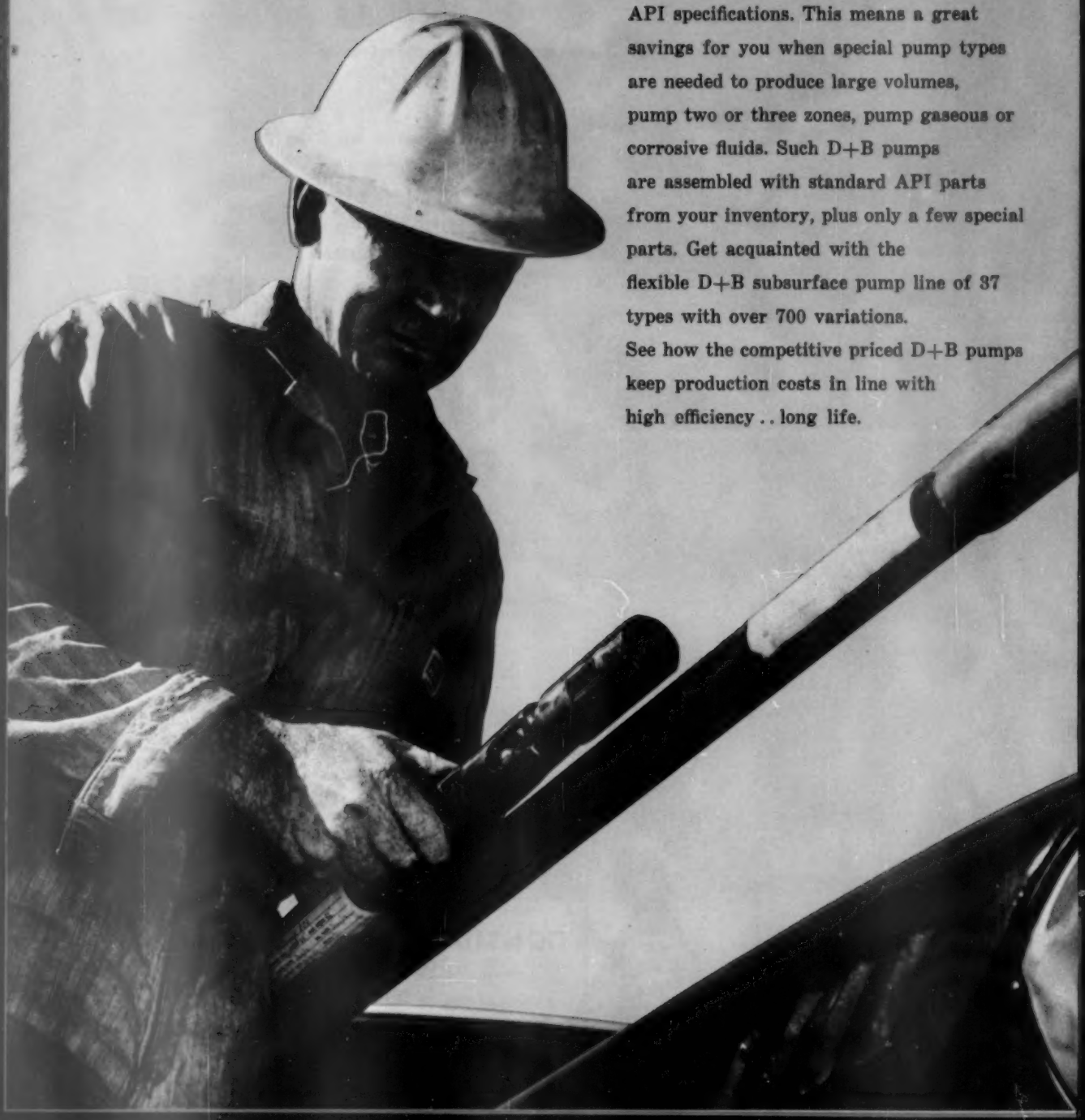
Kwik-Grip

CLAMPS

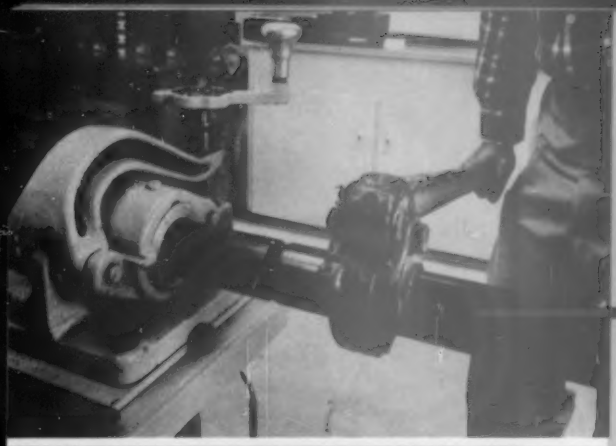
Available in two or one-bolt units, Kwik-Grip clamps are designed for fast, one-man installation. Simple tee-head bolt construction cuts installation time and eliminates "knuckle-busting."

AND D+B SUBSURFACE PUMPS

There's a combination to pump every one of your wells



D+B subsurface pumps are made to API specifications. This means a great savings for you when special pump types are needed to produce large volumes, pump two or three zones, pump gaseous or corrosive fluids. Such D+B pumps are assembled with standard API parts from your inventory, plus only a few special parts. Get acquainted with the flexible D+B subsurface pump line of 37 types with over 700 variations.
See how the competitive priced D+B pumps keep production costs in line with high efficiency .. long life.



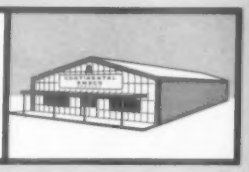
IT TAKES SPECIAL TOOLS SPECIAL TRAINING TO KEEP YOUR SUBSURFACE PUMPS AT TOP EFFICIENCY

Especially equipped D+B subsurface pump shops like these are located in producing areas everywhere. Here you find that only factory trained.. field experienced.. men work on your pumps. An assurance that your pumps will stay in the well longer with fewer pulling jobs.. less production lost.

For Service that Sings..
Equipment that Hums.. Go..

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide



P924

CONTINENTAL-EMSCO COMPANY • A Division of The Youngstown Sheet and Tube Company • General Offices: Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y. • Continental-Emsco Company Limited • General Offices: Calgary, Alberta, Canada
Continental-Emsco Company C. A., Caracas, Venezuela • Plants: Houston and Garland, Texas; St. Albans, Herts., England
Representatives in All Principal Oil Fields of the World

Litho in U.S.A.

Carbide put a

Gas turbine in steam power cycle

. . . at its Texas City plant

Can a gas turbine be used effectively in a chemical or other process plant? This is quite a general question. The answer can only be yes and no; the gas turbine can be effectively used only if conditions are right and it is properly applied. Also a solution that is good and applies in one plant may not necessarily be proper for another plant. At Texas City, with certain conditions slightly altered, the application of a gas turbine could have changed from being attractive to being unattractive. Here are the problems that faced Carbide and here is how they were solved.

By JOSEPH E. PARKER
Utilities Engineering Supervisor Union Carbide Chemicals Co.
Texas City, Tex.

THE TEXAS CITY PLANT of Union Carbide Chemicals Co., division of Union Carbide Corp., went on stream in 1941. It has since undergone several expansion programs.

Steam and power requirements continued to grow and authorization was given in 1956 for an additional 200,000-lb./hr., 1,000-psi. boiler and a 7,500-kva., 13,800-volt turbine generator. It was planned to make a unit installation of these two items as part of our No. 2 steam and power plant which now includes two 200,000-lb./hr., 1,000-psi. boilers and one 6,250-kva. 13,800-volt turbine generator. (See article by Max A. Ladt on the Carbide Texas City outdoor boiler installation—The Oil and Gas Journal, July 18, 1955, page 87.)

Compressed-Air Drives

During this same period, another problem had become more acute—the problem of adequate compressed air. This air shortage had been developing for some time, but at a rate that did not warrant any major new installations. As a result, the shortage was being partially met by portable compressors. It was not until it was found that the number of portable compressors in continuous service had risen to nearly 30, and that additional large compressed-air requirements were developing, that it was decided some permanent solution would have to be achieved.

Three solutions . . . A study was made of the air situation on the basis of three solutions: (1) use of more portable compressors, (2) installation of reciprocating compressors, or (3) use of a centrifugal compressor. For the drive of the centrifugal machine, three different types of drives were considered—electric motor, steam turbine, and gas turbine. Use of additional portable compressors was eliminated on the basis of high cost, low reliability, safety hazard, fire hazard, and noise. The study of the centrifugal machine showed that in small to medium sizes, electric motors or steam turbines could be used attractively for the drives. However, in large sizes, the use of motors or steam turbines could not be justified because of the adverse effect it would have on the plant steam and power balance; and also because of the high utilized investment costs for steam and power that would have to be charged against the installation. This narrowed the consideration to reciprocating gas engine-driven compressors and the centrifugal gas turbine-driven compressor.

Recip or centrifugal? . . . The use of either reciprocating or centrifugal machines offered attractive return on investment and would have afforded a satisfactory solution. A comparison of the two types of drives showed that the most serious disadvantage of the gas turbine was its low thermal efficiency. For a single-shaft, simple-cycle gas turbine, the thermal efficiency figured to be about 17.2%. Even with a regenerator, it would only raise this efficiency to about 28%; whereas, gas engine thermal efficiencies range from 24.0 to 33%.

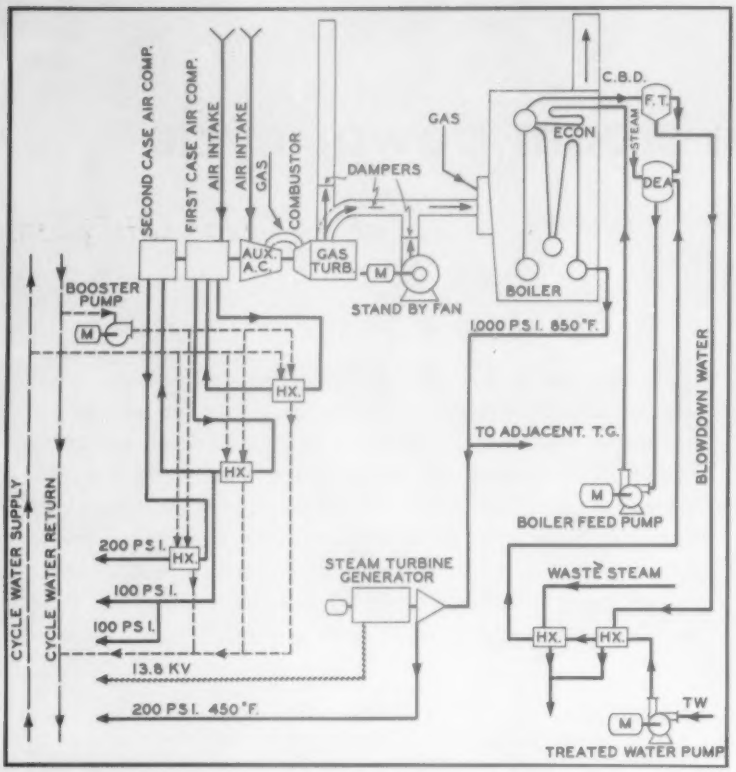
Therefore to make the gas turbine competitive on the basis of thermal efficiency, effective utilization of the heat in the exhaust would be necessary. One thing in favor of the gas turbine in respect to its heat cycle is that it is capable of using a wide range of residue fuels, whereas, the gas engine is limited to a high-quality fuel gas.

Waste-Heat Recovery

At this same time, it began to appear that the new boiler installation would be inadequate to meet the new load requirements. Therefore, we turned our attention to the possibility of utilizing the gas turbine exhaust heat for steam generation such as in a waste-heat boiler. It was determined that with the heat available in the exhaust gases, as much as 35,000 or 40,000 lb./hr. of steam could be generated in a waste-heat boiler. However, the most effective utilization would be achieved by generating low-pressure and low temperature steam while the plant need was for steam of higher pressure and temperature.

Straight waste-heat boiler? . . . We have four primary steam systems in the plant—1,000 lb. at 850°, 600 lb. at 750°, 200 lb. at 450°, and 70 lb. at 400°. At full load the gas-turbine exhaust temperature will run approximately 840°. This eliminated the possibility of generating 1,000-lb. steam. The 600-lb. steam could be generated, but the economics were not attractive because of the narrow ΔT which limited the amount of heat recoverable, and the cost of the boiler would be rather high for this pressure range.

Paper presented at American Power Conference at Chicago.



FLOW DIAGRAM for the gas turbine-air compressor-boiler-turbine generator installation at Carbide's Texas City plant. Fig. 1.

Either of the 200-lb. or the 70-lb. steam would be attractive from just the standpoint of investment cost for the boiler as compared to the quantity of steam that could be generated by the waste heat recovered. However, the attractive economics disappeared when this recovery was fitted into the over-all steam and power balance.

The trend of the production units has been to the higher pressures and temperatures with corresponding reductions in the demand for low-pressure steam. Therefore any steam generated at the lower pressures would replace steam now being supplied from the exhaust of back-pressure turbine generators, necessitating a power switch to condensing machines with a corresponding increase in heat loss to the condenser cycle. As a result, the net gain would be very small, and the return on investment based on this net gain was not adequate to justify the installation.

Feed-water heating? . . . Since a straight waste-heat boiler could not be justified, our attention turned to the possible use of an economizer for feed-water heating in the boiler. It was found that only a small portion of the turbine exhaust heat could be recovered since the amount of heat in the turbine exhaust was well in excess of the heat that could be utilized for feed-water heating. We would like to point out here again that each case must be considered on its own requirements. The recovery of this waste heat for steam generation or feed-water heating could not be justified in our plant, but this was partially due to other features of our system which reduced the net gain to be realized. Some of these solutions which were not justified in our case might be attractive under other conditions.

Hot-Air Generator

We then investigated one more possibility which turned out to be very attractive for our conditions. This solution presented itself because of one of the basic features of gas turbines which is generally considered to be a handicap and which causes the low thermal efficiency—that is the high excess air in the exhaust. Since the power developed by the turbine is dependent, among other things, upon the mass gas flow and also since the temperatures through the machine have to be controlled in line with the capabilities of the metallurgy, the gas turbine operates with about 400-500% excess air.

Heating this large quantity of excess air accounts for most of the heat loss in the turbine exhaust. Due to this excess air, the turbine exhaust contains a relatively high percentage of oxygen. The available oxygen in the exhaust is about 18-18½% of the total flow which is only slightly lower than that in the air.

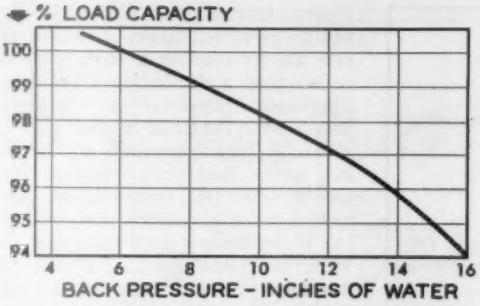
Therefore, the exhaust stream of the gas turbine instead of being exhaust gases, as we normally think of them in connection with engine or boiler exhaust, is actually **highly heated air.** The exhaust from a gas turbine should be more correctly referred to as the exhaust air flow rather than the exhaust gas flow. It is possible that this misnomer has caused attractive applications of gas turbines to be overlooked. (See article by Ivan Rice in The Oil and Gas Journal, June 29, 1959, pg. 66.) Therefore, this exhaust stream should not necessarily be considered the primary heat source but rather a secondary heat source in support of primary combustion. We refer to the gas turbine that we are installing as a **combination forced-draft fan and air preheater.**

Indirect Heat Recovery

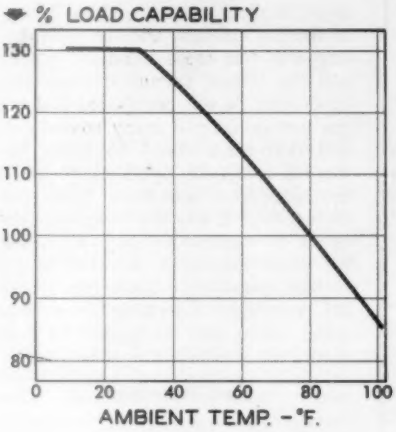
We then changed our approach to this problem, and reviewed it from the standpoint of how much heat was available if **we fired enough fuel to utilize the available oxygen in the exhaust and reduced the final flue-gas temperature to normal exit boiler conditions.** On this basis it was determined that between 250,000 and 300,000 lb./hr. of 1,000-lb. steam at 850° F. could be generated.

We found that the boiler we had on order could be converted at about a 10% increase in cost to fit these new conditions. The primary change required was to enlarge the gas passages to accommodate the larger flue-gas flow. The boiler was originally planned to have an air preheater and since this was no longer necessary, it was replaced by an economizer section. With the air preheater, it was found to be more efficient to go to 70-psi. deaeration. However, with the conversion to an economizer section, the deaeration pressure was dropped to 10 psi. to give a lower temperature water to the economizer, and therefore permit a greater heat recovery and lower exhaust flue-gas temperature.

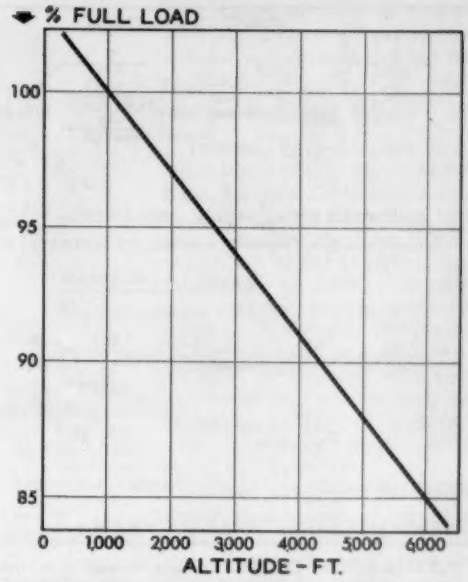
High-pressure steam . . . With these changes the boiler was rerated for 250,000 lb./hr. when operating on gas turbine exhaust. Therefore, for only a 10% increase in cost, a 25% increase in capacity was obtained. Of utmost importance was the fact that this increase in steam, obtained indi-



EFFECT OF BACK PRESSURE on load capability at constant speed and temperature of 7,000-hp. gas turbine. Fig. 2.



AMBIENT TEMPERATURE effect on load capability at constant speed and back pressure of 7,000-hp. gas turbine. Fig. 3.



ALTITUDE CORRECTION CURVE for 7,000-hp. gas turbine. Fig. 4.

rectly through waste-heat recovery, could be supplied at our highest primary pressure, thus giving the most efficient and flexible use of the steam to meet the plant requirements. This is best exemplified by the fact that this additional high-pressure-steam capacity made it possible to increase the size of the steam turbine generator from 7,500 kw to 9,375 kw. The over-all flow pattern of this installation is shown in Fig. 1.

Boiler and Gas-Turbine Conditions

As mentioned, the gas passages of the boiler were enlarged slightly to accommodate the higher gas flows. Since this is a pressurized fired boiler, there is no induced-draft fan to compensate for any increase in pressure drop. Therefore, any increased pressure drop would be reflected back to the forced draft fan which in this case was the gas turbine. There is a reduction of about 1% in turbine capability for each 2 in. of water increase in exhaust pressure. Fig. 2 shows the effect of this back pressure on the turbine capability.

Effect of ambient temperature . . . Fig. 3 shows the effect of ambient temperature on the turbine capability. This latter feature is very important, especially in colder climates. The gas turbine, normally rated at 80° F., can deliver 130% of rated capacity at 40° F. ambient air temperature. At lower temperatures this increase would be even greater, but due to mechanical reasons, the overload is limited to 130%.

Altitude . . . This has a similar effect on the output since the lower inlet atmospheric pressure reflects like a higher exhaust pressure. The turbines are normally rated at 1,000 ft. elevation and a 3% loss of capacity is experienced for each additional 1,000 ft. of elevation. This is shown in Fig. 4.

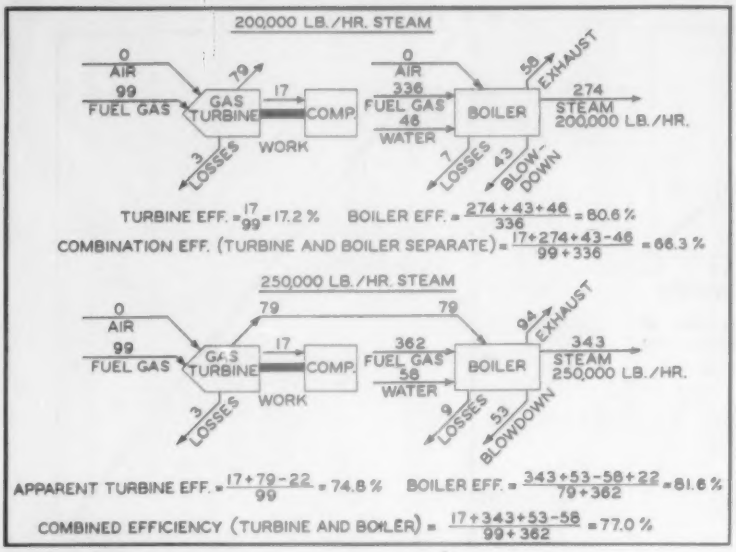
An economic balance must therefore be determined between increased boiler cost for larger gas flows as against turbine loss due to higher back pressure. Relative values can be seen in that for given conditions, the boiler rated at 200,000 lb./hr. on normal forced-draft firing would have a flue gas flow of about 270,000 lb./hr. Under the same conditions, operating at 250,000 lb./hr., the flue gas flow would be approximately 340,000 lb./hr. Whereas, firing gas-turbine exhaust at 250,000 lb./hr., the flue gas flow would be about 380,000 lb./hr.

Efficiencies

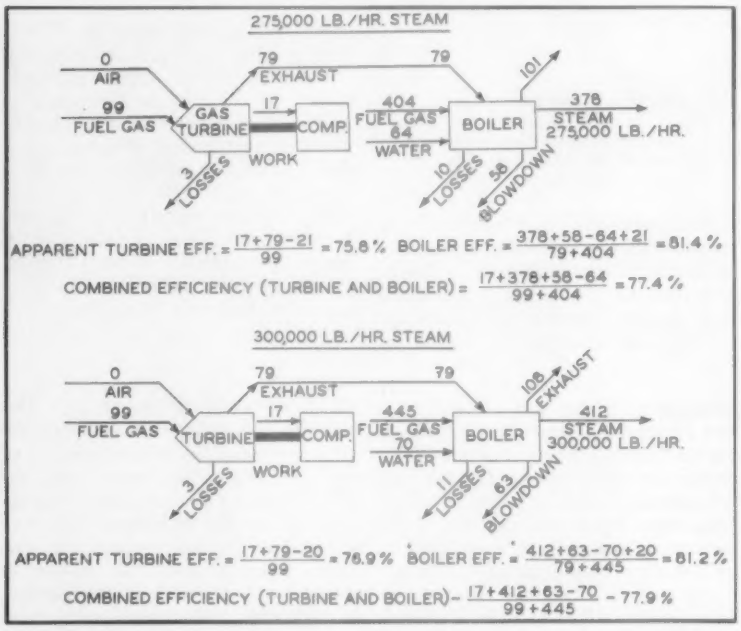
It was found that the over-all thermal efficiency of the combined gas-turbine-boiler unit would be 77.0%. This is shown in Fig. 5. Breaking this down, the apparent turbine efficiency would be 74.8% as compared to 17.2% when operating independently. The apparent boiler efficiency under these conditions would be 81.6% as compared to 80.6% when operating independently; therefore, what had been the most serious drawback of the gas turbine—the low thermal efficiency—has been eliminated, and as a matter of fact, this disadvantage now becomes one of its most important assets.

High thermal efficiency . . . This can be seen when we compare the new apparent thermal efficiency of the gas turbine of 74.8% with the best efficiency that can be expected of a gas engine of about 33%. The exhaust of the gas turbine will normally contain sufficient oxygen to support a boiler load of 300,000 lb./hr. While the boiler is nominally rated at 250,000 lb./hr., it is felt that because of the conservative design of the gas passes, it will be possible, at least for intervals, to operate at 275,000 to 300,000 lb./hr.

Fig. 6 shows the efficiencies for these loads. The apparent turbine efficiency increases to 75.8 and 76.9% respectively for these, while the boiler efficiency drops slightly to 81.4% and 81.2%. This is due to better utilization of the turbine exhaust in the boiler with reduction of the portion of the boiler stack exhaust that is chargeable to the turbine. The combined efficiency increases in 77.4 and 77.9% at these higher loads. This



GAS TURBINE-BOILER CYCLES. It was found that over-all thermal efficiency of the combined gas turbine-boiler unit would be 77.0% at 250,000 lb. per hour steam generation. Fig. 5.



GAS TURBINE-BOILER CYCLES. It was found that over-all thermal efficiency of the combined gas turbine-boiler unit would be 77.9% at 300,000 lb. per hour steam generation. Fig. 6.

further increases the attractiveness of this installation. It **also points out the necessity of matching the boiler with the turbine to fully realize the potential gains of such an installation.**

The only remaining disadvantage of the gas turbine was then found to be size. In this case, this was a relatively minor disadvantage. However, in some applications it could be serious enough to be a deciding factor. To utilize the full 7,000 hp. of the gas turbine would require a compressor that would produce more air than was actually needed. However, it could be justified for flexibility and load growth. While there was some concern about tying up too much capacity in a single unit, it was found that this new compressor would fall within the limits of acceptable proportions. **It is still recognized that when it is necessary to shut down this unit, careful planning will be necessary to avoid air shortages.**

This will be the first installation of a gas turbine in Union Carbide Corp., and the first installation of something new always receives a more critical review than a duplication of existing equipment. However, gas turbines have been in operation in other places, primarily gas-compression and pipeline service and public utilities, for several years. (Ed. note: the first gas-turbine power generation was installed by Braun-Boveri in Switzerland in 1938.) Sufficient operating experience has been gained to indicate their reliability.

Reliability was one of the reasons for the selection of the 7,000-hp. single-shaft, simple-cycle unit. As the name implies, it is the simplest of any of the gas turbines, and the 7,000-hp. size was the most standard, having had the largest amount of operating experience. It was recognized that the gas turbine offered many advantages, and that there could be many numerous profitable applications for it in the process industries. Therefore, even though it was not completely out of the development stage, we felt that we were justified in selecting a gas turbine, because we could gain practical first-hand operating experience which could then be applied in evaluating other possible applications.

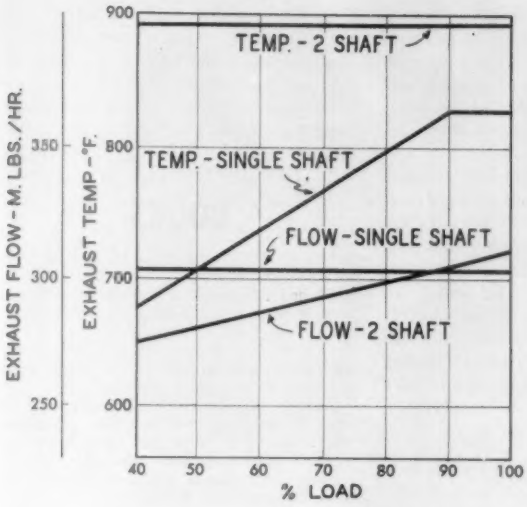
Cost Reductions

The high combination efficiency that we mentioned previously also reflected another advantage of the gas turbine—reduced operating cost. The estimated operating cost per thousand cubic feet of air produced is 26% lower for the gas turbine than for a gas-engine reciprocating compressor.

Steam-cost reduction . . . There will also be a reduction in steam costs due to the higher efficiency and to the reduced operating personnel requirements per unit of steam since the same personnel can operate the larger boiler and gas-turbine combination as would be required to operate the boiler alone. There will also be an auxiliary power saving since it will not be necessary to operate a forced draft fan for combustion air.

Simplicity and compactness . . . These features of the gas turbine, as well as the high capacity per unit, gave another savings in installation cost. It was estimated that per unit of capacity, the purchase and installation cost for the gas turbine would be 14% less than that for a reciprocating installation. It is interesting to note that this size advantage which reflects the 14% reduction in installation cost also appeared earlier as a disadvantage when considering the amount of capacity tied up into a single unit.

It was found that incorporating the



ESTIMATED characteristics of 7,000-hp. single-shaft and two-shaft gas turbine. Fig. 7.

gas turbine with the boiler would not delay the delivery or installation of the boiler. As a matter of fact, it is indicated that the gas turbine will be ready for installation before the boiler is ready. This was a consideration since a developing steam shortage demanded the most expeditious handling of the boiler installation.

With this last obstacle removed, and with an attractive return on investment, the decision was made to purchase and install a gas-turbine-driven centrifugal air compressor.

Gas-Turbine Selection

The single-shaft machine was selected because of exhaust-flow considerations, in addition to the features previously mentioned of simplicity, reliability, cost, etc. The quantity of exhaust flow from a sigle-shaft machine is constant at all loads with the exhaust temperature varying with load changes. The two-shaft machine exhaust temperature stays constant, but the quantity of exhaust varies with load changes. This can be seen in Fig. 7.

With the combination application such as we adopted, it was necessary to have a constant exhaust flow since we were dependent upon the oxygen in the exhaust to meet the combustion requirement in the boiler.

The temperature was not critical since any reduction in exhaust temperature could be made up by burning slightly more fuel. However, a reduction in flow as occurs in the two-shaft machine would, if the load dropped significantly on the turbine, reduce the capability of the boiler.

There are other types of applications in which just the reverse would have been true, and the two-shaft machine would have been better suited than the single-shaft. It was also determined that this would be a base-loaded unit, and therefore, a wide range of speed control of the turbine, which is readily available in the two-shaft machine, would not be required.

Air Compressor

Taking a look at the air compressor, it is interesting to note that these requirements, outlined for the gas turbine, caused what might be considered abnormal requirements of the air compressor. As pointed out previously, the air compressor will originally be supplying air to several systems, and it will be desirable to be able to vary the proportions going to each of these systems. However, under any set of proportions, the load on the gas turbine should remain constant at 7,000 hp. or there will be a loss in system efficiency.

Some more problems . . . It may be desirable later to discontinue the supply of air from the centrifugal compressor to the high pressure air system, and to supply all of the air to the low-pressure systems. Under these conditions, we must still be able to utilize the full horsepower capability of the turbine by increasing the flow of low-pressure air to compensate for the elimination of high-pressure air. It was necessary to do all of this with little or no loss of efficiency and no additional expenditure to rebuild the compressor.

Also, to maintain maximum efficiency, it was desired to be able to disconnect the high-pressure stages and not to have to spend power to operate them when they were not producing. For this reason, a two-case compressor was selected with the discharge from the first case being in the 100-lb. range so that later conversion would permit disconnecting the second case and taking the full output from the exhaust of the first case. Intercoolers were located at this point too, so that after the conversion these intercoolers without any alteration would become aftercoolers for the final discharge.

Cooling Water

The heat load on these inter and aftercoolers will be about **16,000,000 B.t.u./hr.** Most of this heat load can be removed at a fairly high temperature level since the air will leave the compressor bodies at temperatures up to 390° F. In order to minimize the load on our cooling-water system, which is a closed-cycle system with cooling towers, it was decided to top off most of this heat with hot-cycle water return. Only the final cooling of the air to 115° F. will be done with cycle-water supply which is about 85° to 90° F.

Booster pumps will be installed to supply return cycle water at about 115° F. to the coolers to pick up the major part of the heat. Both sources of water will be supplied to each of the coolers and a common outlet will return the water to the cooling tower. Since the heat removing capacity of a cooling tower increases with water temperature, the **entire heat load of 16,000,000 B.t.u./hr. can be handled with an apparent additional heat load on the cooling system of about 2,000,000 B.t.u./hr.**

Layout and Control

Our No. 2 steam and power plant is an outdoor installation. It was found that the gas turbine would not be suitable for completely-unprotected outside installation due to the high temperature of some of the operating parts. Sudden cooling by heavy, cold rains could cause dangerous thermal stresses and shocks. However, by only slight modifications in the external design of the turbine (such as some additional shielding and insulation) it was deemed satisfactory to install the unit outside with only a roof over it. This roof will be a portable covering so that during periods of maintenance, the entire roof section can be lifted off by a crane and set out of the way to give unlimited access to the turbine.

Turbine controls location . . . Since the turbine actually is an integral part of the boiler, the turbine controls will be located on the same control console in the central control room as the boiler controls. A small weatherproof enclosure about 3 by 4 ft. by 18 in. is being located adjacent to the turbine to house the combustion control system, the three of four relays required, the thermocouple temperature indicator, and the combustion sentinel controls. All other controls will be on the console in the control room. It will be possible for

the operator at the control console to have complete control of the gas turbine from standstill through startup and operation, and back down through the shutdown sequence to standstill.

Damper system . . . To facilitate this coordinated operation, the turbine exhaust will be controlled through the operation of three dampers; one in the turbine exhaust to the atmosphere, the second in the turbine exhaust to the boiler wind box, and the third in the forced-draft fan exhaust to the boiler wind box. It will be possible to adjust each one of these dampers by a control from the turbine-boiler console.

In normal operation, the turbine exhaust to the atmosphere and the forced-draft fan exhaust to the wind box will be closed, and the turbine exhaust to the wind box will be opened.

In case of an emergency loss of the gas turbine, there will be a throwover switch which, in one operation, will reverse the position of all dampers and will start the forced-draft fan motor. This will assure continuity of operation of the boiler even if the gas turbine is down. Control for emergency loss of the boiler will not be necessary other than to shut off the fuel-gas supply since even with tube failure or some other difficulty in the boiler, the exhaust temperature of the gas turbine, approximately 840° F., can continue to flow through the boiler setting for a short time without any danger to the boiler. During this time, the necessary changes can be made to continue operation of the gas turbine while the boiler is off.

Stacks removable . . . The air-intake stacks for the gas turbine and the centrifugal compressor will be self-supporting and will be removable with the turbine roof. These stacks will be about 50 ft. high which will be about 5 ft. lower than the boiler and turbine exhaust stacks. There will be no provisions made for filtering or washing the air to either the compressor or the turbine. It is felt that the flue-gas temperature coming out of the boiler stacks will create a rising air current which will prevent sucking the flue gas into the air-intake stacks. The air-intake stacks will also be upwind of the boiler for the prevailing winds in the area.

By being 50 ft. off the ground, any ground-level dust or contaminants will not enter the air intake. A coarse-mesh screen with a rain hood will be provided to keep out birds, large foreign objects, and large amounts of water. However, any moisture entrained in the air will be very low in solids and should actually have a beneficial effect on both the gas turbine and the compressor. It will provide increased mass flow, possibly accomplish some washing of blading, and will reduce compression-temperature rise.

The turbine-oil system will provide lubrication for both the turbine and the compressor, and will provide the oil for the hydraulic turbine controls. This oil pressure will normally be supplied by a main-shaft oil pump. In addition, there will be an a.c. motor-operated auxiliary pump, and this will be further backed up by an emergency 125-volt d.c. motor-operated auxiliary pump.

Fuel

The fuel-gas supply for the turbine presented somewhat of a problem. Our normal natural gas streams are at a pressure which is too low for the turbine requirements. Using our regular fuel-gas streams would have necessitated an expensive installation of auxiliary gas-booster compressors; however, it was found that a steady stream of byproduct gas could be made available in sufficient quantity and with adequate pressure to meet the turbine requirements. With only the installation of a pipeline, this gas, with an HHV of about 710 B.t.u./cu. ft. will be supplied to the turbine and we will thereby eliminate the need for the booster compressors.

Conclusion

While it will be 2 or 3 years before we will have sufficient operating experience to conform or disprove our decision, we feel that it will be confirmed and that we have every reason to expect reliable, efficient, and profitable operation from this gas turbine-boiler combination. We believe that the gas turbine offers many advantages as a prime mover and that the years to come will see an increasing number of installations in industrial plants. (See the Journal Gas-Turbine Survey in June 29, 1959 issue.)

BOOKS

ECONOMICS OF THE MINERAL INDUSTRIES. Edited by Edward H. Robie. Published by American Institute of Mining, Metallurgical, and Petroleum Engineers, Inc., New York. 756 pp.

Part of the contents of this book deals with the petroleum industry, although most is aimed at mining.

Among subjects treated are chapters on cost of acquiring and operating petroleum and natural-gas properties, bank loans on oil and gas production, marketing of petroleum and natural gas, and special features of petroleum accounting.

SURVEY OF SOLUBILITY DIAGRAMS FOR TERNARY AND QUATERNARY LIQUID SYSTEMS. By D. M. Himmelblau, B. L. Brady, and J. J. McKetta, Jr. Published by Bureau of Engineering Research, University of Texas, Austin 12. 42 pp. $2.

Solubility data have become more abundant each year, but often are buried in a mass of other data which conceals and frequently obliterates them. Often the same data have to be recreated by time-consuming laboratory experimentation when a quick inspection of a reference table would show where the desired information exists.

Among groupings presented are: systems containing water and two organic compounds with a crossreference between the most common systems; nonaqueous organic systems with crossreferences; systems containing liquid propane and two nonaqueous components; quaternary systems; systems containing water, one organic liquid, and one metallic-organic compounds.

Note: The Oil and Gas Journal maintains a book department. Write to the READER SERVICE DEPARTMENT, P. O. Box 1260, Tulsa 1, for copies of the book list. Often books reviewed here may be purchased from this source.

NEXT WEEK . . .

Exclusive World Report on Petrochemicals

THE TOP petrochemical producer is still the U. S., but the rest of the free world is increasing capacity at a fast clip.

These and other significant trends will be analyzed in the Journal's special Report on Petrochemicals next week.

For the first time, the annual survey will include existing plants and construction in Europe, Asia, Australia, and Latin America, as well as the U. S. and Canada.

Watch for these topics in the Journal's September 7 issue:

- Construction at home and abroad.
- The influence of foreign chemical activity on U. S. exports.
- The demand for petrochemicals and what's ahead.
- The changing pattern in Europe.
- Petroleum vs. coal in the field of chemistry.

The newest and one of the largest paraffin-wax manufacturing plants in the world is . . .

Atlantic's new $10,000,000 wax plant

• The 250-ton per day unit is engineered to produce close-cut, low-oil-content paraffin waxes of highest quality. Texaco solvent dewaxing process assures waxes having good hardness characteristics and high blocking temperatures.

BY J. R. GHUBLIKIAN
Badger Manufacturing Co.,
AND J. B. CLAPHAM, W. T. DIXON
AND D. E. WIGFIELD
Atlantic Refining Co.

ONE of the largest paraffin-wax-manufacturing plants in the world has recently been placed in operation by Atlantic Refining Co. at its Philadelphia refinery. This plant, using the Texaco solvent dewaxing process, was engineered and constructed by Badger Manufacturing Co. Investment cost of the on-site facilities was approximately $10,000,000.

This unit will not only significantly increase Atlantic's wax capacity, but also should permit the production of fully refined waxes having hardness and high blocking temperature second to none.

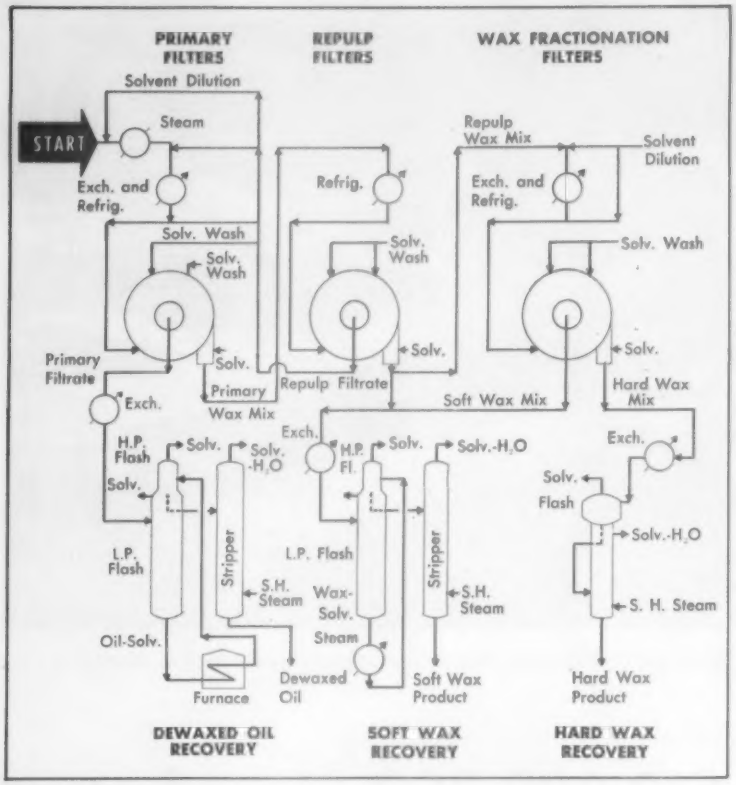
Several years ago Atlantic took a long, hard look at its wax-manufacturing facilities. Basically, these consisted of plate-and-frame presses, most of which had been in use for over 50 years, and sweat ovens which were nearly as old. These had been supplemented in recent years by an emulsion deoiling unit and a vacuum still for the slack wax.

All units were operating at capacity, but were still unable to satisfy the demand. Furthermore, the sweat ovens used for final deoiling of refined wax could not keep up with the trend toward lower product oil content without a further sacrifice in capacity.

Modernization due . . . Atlantic decided that a major modernization and expansion was in order. It set as its goal the production of something over 250 tons per calendar day of close-cut, high-quality, low-oil-content paraffin waxes. It had available a sufficient quantity of wax-bearing crudes, and a recently built atmospheric-vacuum pipe still capable of fractionating these crudes into narrow-boiling-range cuts.

What was needed, then, was a process and a plant to make the initial extraction of the wax from these distillates, to deoil this wax, and, for still further quality improvement, to fractionate the deoiled wax by melting point. To satisfy these needs, a three-stage methyl-ethyl-ketone unit was chosen. Fig. 1 is a simplified flow sheet of this unit.

The three filtering stages of the new unit are dewaxing, repulping, and wax fractionation. The first two stages are normally operated at temperatures of the order of 10° to 20° F., with the repulping stage operating at 10° F. above the dewaxing stage. The dewaxed oil product of the first stage is stripped of its solvent content, and provides paraffin oils. The repulp wax mix, containing a fairly low-oil-content slack wax, is reheated to solution without stripping, and



SIMPLIFIED FLOW DIAGRAM shows important processing steps in Atlantic's wax manufacturing operations. Fig. 1.

chilled to temperatures of the order of 60° F. for charge to the wax fractionation filters.

In this stage, the higher-melting-point hard waxes are recovered as filter cake, while the lower-melting-point waxes, together with practically all of the oil from the repulp wax mix, appear in the filtrate. The stripped cake, after acid treating and clay percolation, is the fully refined wax product; the filtrate is sweated to crude scale wax and may be acid treated and clay percolated to a semi-refined wax.

The unit is also manifolded in such a way that the wax-fractionation filters can be used in repulp service, so that additional scale or semirefined wax may be made via the two-stage route followed by sweating.

Atlantic has expanded its acid-treating and clay-percolation facilities and its tankage to match the increased wax-production capacity, and has completely mechanized its wax-slabbing equipment.

Design Features

Atlantic's new dewaxing-deoiling plant includes a number of innovations and improvements on conventional solvent-dewaxing-plant designs. Some features were adopted to assure better quality product or more efficient operation and maintenance. Others were devised to obtain economy in design and construction.

1. In addition to the normal segregation of moist and dry solvents, further solvent segregation is necessary. The production of 0.2% oil-content paraffin wax requires that care be taken to hold the oil content of the solvent at a very low level, particularly during the wax-deoiling step. In this plant the natural selectivity of the process for oil and wax is used to segregate recovered solvent into oil-bearing and oil-lean-solvent streams.

Oil-lean solvent (0.02 wt. % maximum oil content) is recovered in the wax-recovery systems and used in the wax-fractionation system. Oil-bearing solvent (0.1 wt. % maximum oil content) is that recovered in the dewaxed oil-recovery system and is used as dilution and wash solvent in the dewaxing-repulp systems.

2. In its new paraffin-wax plant, Atlantic at times processes selected lower-boiling waxy distillates. When processing these stocks, oil contamination of the solvent recovered in the double-effect dewaxed-oil recovery system is controlled in each effect by fractionation using several bubble trays under suitable solvent reflux.

A substantial amount of oil is carried overhead also with the last traces of solvent stripped from the dewaxed oil product. The oil contained in this stream is subsequently rejected from the plant as the bottoms from a 25-tray solvent fractionator.

3. In a departure from previous solvent dewaxing practice, repulping of slack wax separated in the primary filtration is made more effective by use of a controlled heating and chilling step between filtrations. Slack wax mix is heated to the desired temperature by warm recirculated wax mix and warm solvent additions to obtain partial melting of the wax. This mixture is then chilled in scraped double-pipe chillers to the repulp filtration temperature.

4. The inert gas used to blanket equipment in solvent-dewaxing units must be sulfur-free to avoid corrosion and to insure high-quality odor-free wax. Since there are some times during the year when sweet gas is not available at the Philadelphia refinery to fire the inert-gas generator, a small H_2S-removal system utilizing caustic soda is provided to clean up high-sulfur refinery gas when required.

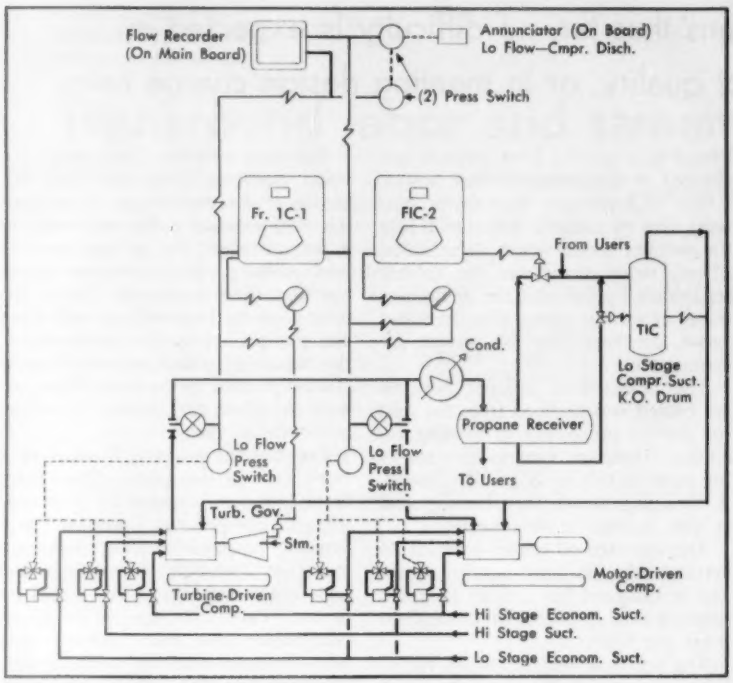
5. A separate hard-wax solvent-recovery system is included in the new plant to assure hard-wax product quality and to avoid equipment and product contamination with oil. This equipment is reserved for processing only the lowest-oil-content wax products made in the wax-fractionation operation.

Throughout the entire low-oil-content-wax system, careful attention has been paid to eliminating or controlling sources of oil contamination, particularly from external lubricants.

6. The new plant is designed for easy expansion when the need arises. The filter house is large enough to accommodate an additional filter. Refrigeration capacity — a problem in many older units—is provided at 20% greater than design requirements.

7. The filter building arrangement features a compact, economical design with filters and filtrate receivers supported at grade. Low NPSH vertical multistage centrifugal pumps are used to deliver filtrate to solvent recovery. Filter feed, filtrate and vacuum piping have been greatly simplified by careful planning. Piping and equipment are arranged so that all filter operations may be controlled from one level. A filter operating panel equipped with remote recording instruments is provided for operator convenience.

8. The 700-sq. ft. filters in this unit are of a new design in which the trunnion bearings are integral with the



CONTROL SYSTEM for propane compressor used in refrigeration cycle. **Fig. 2.**

filter vat, the entire assembly being mounted on a rigid frame in the shops. This filter design, though more expensive, results in a lower-cost filter building.

9. Centrifugal pumps are used to handle cold wax-solvent slurries at the filter boots. The slurries have been a pumping problem on many earlier units, particularly where rotary pumps have been used.

10. For double-pipe exchange-and-chiller equipment, one-shot-type grease lubrication of all bearings, and automatically controlled continuous oil-mist lubrication of all chain drives are provided for ease and convenience of maintenance.

Lubricating oil is delivered from storage through a circulating system to the gang lubricators at each filter. Refilling of the reservoir at each filter may be accomplished by a simple opening of a valve.

11. The double-pipe-exchanger stands on this unit are equipped with removable inner tubes. This feature permits convenient replacement of the inside tubes in locations where wear is encountered. As further insurance, both exchanger and chiller scraper blades are provided with stops to limit the wear of blades against the inner tubes.

12. The oxygen content of the generated flue gas is continuously monitored so that it may be held at safe levels at all times.

13. Consideration of Atlantic's plant steam needs led to the selection of one motor-driven centrifugal refrigeration compressor which is operated in parallel with an identical compressor, steam-turbine driven. Instrumentation which was developed by Atlantic, Badger, and Carrier engineers for this combination, an unusual one, merits some comment. Fig. 2 shows schematically the system used.

Control system . . . Basic control is ratio controller FrIC-1 which balances the load on each machine by controlling the speed of the turbine-driven machine within fixed limits. Normally, the ratio setting is 1:1 which divides the load equally, with both machines running. The position of the air switch is "A" which puts the controller output on the turbine governor (3-psi. output = 100% speed, 15-psig. output = 95% speed).

During a period when the motor-driven compressor is shut down, the switch is turned to position "B" which vents the governor and causes the turbine to run at 100% speed. If the motor is shut down automatically due to overload or some other power failure, with the switch in position "A," the ratio controller will try to match the zero flow from the motor-driven discharge by reducing the speed of the turbine. Since the low limit is 95% full speed, the turbine will slow down to this point.

It is assumed, however, the 95% speed is not enough to handle the load during normal operation so that the turbine normally would be switched to 100% speed when the motor unit is down.

A makeup or artificial-load controller FIC-2 takes a flow signal from either the turbine-driven or motor-driven machine discharge. If flow drops below the set point of this controller, a bypass valve from the propane receiver opens and admits propane vapor to the low-stage compressor-suction knockout drum. A temperature controller sensing the suction temperature admits enough liquid propane at the inlet of the knockout drum to maintain the constant suction temperature.

In the event either machine is shut down, low-flow-pressure switches operated by the flow transmitters in the discharge lines close the valves in the second, third, and fourth-stage suction lines, preventing reverse rotation of the compressor.

Processing Facilities

The plant is designed to handle eight basic stocks supplied from 17 cone-roof steam-heated and insulated tanks with a total capacity of 575,000 bbl. The wax distillate from these tanks is charged via a surge tank on level control.

The process unit, covering 4.2 acres, is geographically divided into three main divisions, (1) chiller and exchanger area, (2) filter area, and (3) solvent-recovery area. These three areas are separated by pipe alleys with the lines carried high enough to give clearance for truck passage beneath, and the control building is centrally located.

Exchanger and chiller area . . . The double-pipe chillers and exchangers are conventional 12-pipe units, arranged in two parallel banks with drive ends facing each other with an operating aisle between. A shelter is provided over this portion but the long rear ends of the units extend out of the shelter and are protected by weather and vaporproof sheet-metal enclosures which are filled with perlite insulation. This housing is provided with separate removable compartments over the return bends so as to make them accessible without disturbing the major portion of the insulation.

Paved and curbed areas behind each row provide for removal of the scrapers and inner tubes.

The flow through the inner pipes in all cases is wax mix on its way to the filters—primary, repulp, or wax fractionation. The primary wax mix is exchanged against primary filtrate, and the wax mix fed to wax fraction-

"On the basis of operations thus far, no difficulty is expected in achieving desired product quality, or in meeting design charge rates."

ation is exchanged against its filtrate. Each chiller is operated with a flooded recirculation refrigerant system.

The double pipes in all chillers are inclined slightly from the horizontal to promote rapid recirculation and gas elimination, thus providing the greatest possible heat-transfer rate.

Filter area . . . Fourteen 11-ft. by 20-ft. 3-in., 700-sq. ft. conventional rotary filters are provided in the filter building and space is allowed for an additional filter.

The chilled wax mix from elevated filter feed tanks flows by gravity into filter vats under liquid-level control. As the drum rotates in the chilled wax-mix solution, dewaxed oil and solvent are pulled by vacuum through the filter cloth and drained into filtrate receivers. Simultaneously the wax cake is progressively built upon the canvas covering. As the wax cake emerges from the oily solution, it is washed by means of solvent sprays, and dried with flue gas while subjected to vacuum.

At the end of the cycle, the cake is subjected to a slight flue-gas pressure and is blown free of the filter cloth and deflected by a scraper blade into a scroll-type conveyor. The discharge conveyor continuously discharges cake wax from the filter into a vertical boot. Here it is diluted and melted by warm solvent (or recirculated wax mix) and pumped by open-type impeller centrifugal pumps into flue-gas-blanketed surge tanks. Here the successive chilling and filtering operation and/or solvent recovery take place.

The filtrate is continuously pumped from the filtrate receivers by means of vertical pumps, through exchange and into flue-gas-blanketed surge tanks for charge to solvent recovery and/or for use as dilution and wash solvent.

Solvent-recovery system . . . Solvent is separated from the soft wax, hard wax, and dewaxed oil in the solvent-recovery system, and returned to storage for reuse. Three separate recovery systems are provided, one for each product.

Solvent is separated from the dewaxed oil by double-effect flash vaporization, followed by stripping with superheated low-pressure steam. Both the low-pressure and high-pressure flash towers yield oil-bearing dry solvent overhead. The low-pressure flash tower bottoms (dewaxed oil mix) are heated in a vertical fired furnace and charged to high-pressure flash tower.

The high-pressure flash-tower bottoms flow by pressure differential into the stripper tower where superheated 25-psi. steam completes the solvent separation by carrying the remaining traces of solvent, along with the water vapor, overhead into the solvent decanting tank.

The dewaxed-oil stripper bottoms are cooled and pumped from the unit for further processing in existing facilities. These are used as base stocks for paraffin oils or as cracking stock. A stripping steam superheating coil is also located in this heater.

The dewaxed-oil heater contains 86 vertical tubes in four parallel passes and is designed for a total heat absorption rate in excess of 64,000,000 B.t.u. per hour.

The soft-wax and hard-wax recovery systems are similar to the dewaxed-oil recovery system in that the solvent is separated by flash vaporization followed by stripping with superheated low-pressure steam. Steam heaters, however, are used in lieu of a fired furnace, to eliminate the possibility of overheating and cracking the wax.

In each system, the solvent is taken overhead, and the wax from the bottom. In all flash and stripping towers solvent reflux is used.

Flue-gas and refrigeration systems . . . The flue-gas and refrigeration systems are located within the recovery area. Flue gas is continuously generated at the rate of 2,000 std. cu. ft. per hour by burning a low-sulfur-content fuel gas in an explosionproof submerged combustion flue-gas generator. The oxygen content of the generated flue gas is continuously monitored by an oxygen analyzer which signals an alarm if the oxygen content exceeds 2%.

In the event low-sulfur fuel gas is not available, an alternate high-sulfur fuel gas is available which must be purified before use.

Two synchronous motor-driven reciprocating vacuum pumps operating at 3.6 psia. suction pressure and 19.7 psia. discharge pressure are used to maintain the vacuum in the filtrate receivers and to supply blowback gas for removal of the dried wax cake from the filter canvas. The 700-hp. motor drivers are force ventilated and are coupled directly to the compressor shafts.

Pulsation snubbers have been provided on both the suction and discharge of the vacuum pumps to limit the total residual pulse amplitudes to a maximum of 2% of the absolute line pressure. Each vacuum pump has been sized to provide 65% of the total capacity required, so that when one pump is down for maintenance, the remaining pump can carry a substantial portion of the load. This permits the plant to continue operation at a reduced rate.

Commercial propane is used as a refrigerant in this plant. The refrigeration system consists of two centrifugal compressors, propane condensers, propane receiver, high-and-low-stage flash-type economizers and high-and-low-stage-suction knockout drums. One 3,000-hp. motor-driven compressor and one 2,800-hp. turbine-driven compressor, each capable of delivering 60% of the maximum total refrigeration requirements, assure continued plant operation and also provide reserve refrigeration capacity to accommodate possible increased production.

Maintenance of these units is scheduled for the winter when refrigeration requirements are at a minimum, and when one compressor can handle the entire load. This reduces considerably the work to be done during scheduled plant shutdowns. The exhaust steam from the 2,800-hp. turbine, along with the steam exhaust from certain steam-driven pumps, satisfies offsite requirements for tank heating.

All propane relief valves are manifolded into a common header running to a 225-ft.-high flare stack which is located offsite. Discharges from relief valves and furnace drop-out valves, which contain solvent, are manifolded into a common header running to an offsite blowdown tank. This tank is equipped with water spray nozzles which serve to recover all condensables.

Initial Operation

The plant was started up during April 1959 and has been operating without a major interruption for nearly 2 months. Because of the large number of charge stocks to be handled in the plant, not all of them have been run as yet. However, on the basis of operations thus far, no difficulty is expected in achieving desired product quality, or in meeting design charge rates, on the average.

BY W. L. NELSON
Technical Editor and
Petroleum Consultant

Turnaround labor and stream efficiency

SHUTDOWN for inspection and repair (i.e., turnarounds) are expensive not only because of the loss of production (or profit) but expensive material and many hours of skilled labor are required (see Table 1). The regular maintenance staff of a refinery represents about 40% of the entire staff (see Process Costimating No. 46 and No. 48, April 27, 1959, p. 165, and May 11, 1959, p. 115), which is the equivalent of about the following man-hours per day:

	B/D crude	Man-hours per day
Independent refiner	10,000	320
Independent refiner	40,000	817
Major refiner	20,000	1,350
Major refiner	100,000	4,480

Other workmen (operators, engineers, laboratory testers, etc.) constitute almost an equal number of man-hours. If all of these men can lay aside all of their regular activities, a major turnaround can be handled by the plant staff during 8-15 days. Additional help is often obtained locally, and in some instances independent contractors[8 13] assist, especially in new modern plants which may employ only half as many

TABLE 2—STREAM EFFICIENCY AND TURNAROUND LABOR REQUIREMENTS (SHANNON*)

Refinery capacity (B/D)—	Average run, months	Cycle-time efficiency	Man-hours labor per 1,000-bbl. capacity†	Days for turnaround, estimate‡
Catalytic cracking:				
Under 15,000	9.4	93	2,000	14.4
15,000-50,000	11.6	95	1,800	12.3
50,000-100,000	13.6	91	2,200	27.2
Over 100,000	12.7	94	1,600	16.5
Alkylation:				
15,000-50,000	9.3	93	700	14.2
50,000-100,000	13.1	95	5,700	14.0
Over 100,000	16.3	96	3,300	13.7
Thermal cracking:				
All	4.3	92	800	7.6
Crude and vacuum distillation:				
All	9.7	96	400	8.2
Solvent units:				
Under 15,000	10.3	95	800	11.0
15,000-50,000	13.0	94	500	16.9
50,000-100,000	12.0	91	2,000	24.2
Over 100,000	15.6	95	2,300	16.7
Catalytic polymerization or reforming:				
Under 15,000	7.8	95	700	8.3
15,000-50,000	8.6	95	500	9.2
50,000-100,000	14.0	93	1,200	21.4
Over 100,000	13.3	94	1,700	17.2

*Shannon, R., Survey of Run Length, Pet. Refiner, March 1955, p. 131. †Capacity of the particular unit, not the entire refinery. ‡Assuming 67% of shutdown time is for turnaround.

TABLE 1—LABOR FOR CATALYTIC CRACKING UNIT TUURNAROUND
(Per cent of each craft*)

Craft—	FCC 18,000 (1949)	FCC 28,000 (1949)	FCC 28,000 (1949)	FCC 9,000-16,000 (war)	FCC 40,000 (1954)	Average FCC‡	Houdriflow 11,000 (1954)	TCC† 6,000 (1949)
Supervision	....	....	....	....	....	....	....	19.4
Pipefitters	22.0	33.0	27.6	23.0	19.1	24.9	21.3	16.1
Carpenters	5.1	3.1	5.0	5.0	5.2	4.7	4.2	6.5
Blacksmiths	0.1	0.3	....	....	....	....	....	....
Riggers	10.5	5.1	6.5	11.0	7.4	8.3	....	....
Machinists	10.4	8.0	7.8	8.0	8.1	8.5	12.7	13.1
Insulators	2.4	2.7	2.5	6.0	3.4	3.1	8.6	‡9.9
Electricians	2.1	3.0	3.7	3.0	3.2	3.0	3.5	2.5
Boilermakers	20.0	11.8	8.8	10.0	15.9	13.3	....	....
Instrument men	3.1	2.8	4.9	4.0	4.3	3.8	1.9	2.3
Tinners	0.6	0.5	....	....	0.8	....	....	....
Welders and burners	8.5	12.9	13.2	11.0	10.6	11.2	3.7	6.3
Brickmasons	0.9	1.8	1.8	1.0	2.5	1.6	....	....
Painters	0.1	1.8	2.9	3.0	2.8	2.1	....	....
Plug gang	....	4.6	....	....	....	....	....	....
Trucks, cranes, etc.	....	2.4	1.8	....	1.4	....	4.4	....
Gas testers	....	0.9	....	....	....	....	....	....
Labor	10.9	5.3	12.1	10.0	13.9	10.4	39.7	23.9
Miscellaneous	3.4	....	1.4	5.0	1.4	5.1	....	....
Man-hours:								
Preliminary	3,826	....	3,760	....	21,946	....	....	....
Total	62,039	37,213	29,650	10,000-60,000	75,575	....	8,114	6,002
Reference	(1)	(2)	(3)	(4)	(5)		(10)	(6, 11)

*Gas concentration and poly units are included in some plants—they require about 30% of the total labor. Dates given with cracking units refer to the years the labor split was determined. †Bucket type. ‡Includes painting. §Average of these shown here with only partial weight for war operations.

TABLE 3—TURNAROUND LABOR FOR CATALYTIC CRACKING UNITS

Capacity (B/D)	Type of unit	Man-hours: Total	Man-hours: Per 1,000-bbl. capacity	Stream efficiency, (%)	Ref.
4,000	FCC (1947)	4,508	1,130	93	13
5,000	FCC (1945)	6,000	1,120	..	5
6,000	TCC (1949)	4,557	760	96	6
6,000*	TCC (1949)	*6,002	1,000	95	11
7,250	FCC (1949)	8,300	1,143	94	7
8,500	FCC (1945)	‡10,000	‡1,180	..	5
10,000	FCC (1945)	‡12,000	‡1,200	..	5
11,000	Houdriflow (1954)	8,114	738	97	10
11,000	FCC (1953)	8,830	800	94	14
16,000	FCC (1945)	‡19,000	‡1,190	..	5
18,000	FCC (1947)	62,000	3,450	..	1
28,000	FCC (1945)	34,000	1,215	..	5
28,000	FCC (1949)	37,213	1,330	98	2
28,000	FCC (1949)	29,650	1,060	97	3
40,000	FCC (1954)	75,600	1,890	96	4
55,000†	(†)	88,000	1,600	94	9

*Average of three runs. Old-style bucket TCC. †Estimated catalytic cracking capacity. ‡60 to 100% more labor when operating as in the war for aviation gasoline.

employes as the average U. S. refinery (see Process Costimating No. 44, April 6, 1959, p. 158).

The manpower required for turnaround with catalytic cracking units seems to be affected little by plant size (Tables 2 and 3) although from most meager data (Table 3) it appears that 5,000-bbl. units may require only 5,750 man-hours whereas a 50,000-bbl. unit (or a refinery with 50,000-bbl. cracking capacity) may require 80,000 man-hours. The literature references of Table 3 which may show the lowest labor requirements indicate smaller manpower requirements than the dependable survey data[9] of Table 2. Wages may be estimated (plus some overtime) from Process Costimating issues Nos. 40 and 50 (February 9, 1959, p. 121, and June 15, 1959, p. 121). The cost of material is about 73% of the labor cost[7 10] but materials costs will be discussed more completely in forthcoming maintenance installments of Process Costimating.

Lost Profits

Down time also eliminates the normal profit. Such losses are shown in Fig. 1 as dollars per year for each barrel of daily capacity as a function of stream or cycle-time efficiency and the normal profit. A profit of 10 cents per barrel (after taxes) on the entire refinery operation represents approximately 3.65% based on investment (or replacement value):

	Per cent of investment
10 cents per barrel	3.65
20 cents per barrel	7.3
30 cents per barrel	10.95

Profits of 50 cents and $1.00 per barrel are never attained in the entire refinery, but these and larger profits are sometimes possible in lubricating-oil manufacture, and possibly in certain octane-improving processes (depending upon which process is considered as the source of the profit). To increase the stream efficiency by 2% usually results in a significant saving.

Generally, cycle-time efficiencies are somewhat as follows (Petroleum Refinery Engineering, fourth edition, p. 224, McGraw-Hill Book Co., N. Y., 1958):

	Per cent
Thermal cracking	92
Catalytic cracking	94
Solvent extraction	94
Alkylation	95
Catalytic reforming	95
Polymerization	95
Crude distillation	96
Vacuum distillation	96

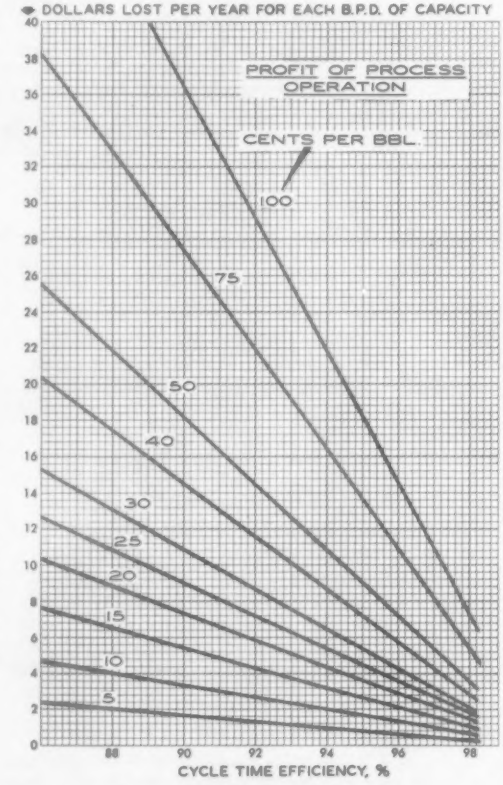
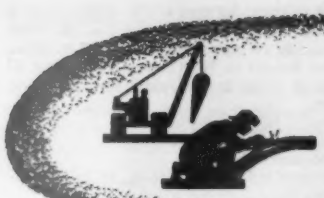


Fig. 1—An indication of lost profits due to down time.

References

1. Foster, A. L., The Turnaround as an Efficient Routine, Pet. Engineer, July 1949, p. C-7.
2. Anon., Sinclair Refinery Makes Turnaround in 309 Hours, The Oil and Gas Journal, Dec. 22, 1949, p. 239.
3. Anon., 13 Day Turnaround, The Oil and Gas Journal, June 9, 1949, p. 94.
4. Cooper & Shaw, 359 Days Uninterrupted Operation, The Oil and Gas Journal, Mar. 21, 1955, p. 199.
5. Hill & Moorman, Turnarounds in Fluid Cata. Cracking Units, Pet. Engineer, Feb. 1946, p. 98.
6. Anon., First Turnaround of Leonard T. C. C. . . ., The Oil and Gas Journal, Feb. 19, 1949, p. 112.
7. Byrne & Jenkins, Maintenance of a Fluid Cat Cracking Unit, The Oil and Gas Journal, Mar. 23, 1950, p. 275.
8. Towler, J. W., How to Get Manpower . . ., The Oil and Gas Journal, July 11, 1955, p. 119.
9. Shannon, R., Survey on Run Length, Pet. Refiner, Mar. 1955, p. 131.
10. Noll, Dart & Bland,, The Houdriflow Catalytic Cracking Process Today, Fourth World Pet. Congress, Rome, 1955.
11. Dougherty, W. F., Repair and Maintenance . . ., Pet. Engineer, May 1950, p. C-33.
12. Johnson, R. L., New Cat Cracking Record, Pet. Eng., Apr. 1951, p. C-50.
13. Anon., Contract Maintenance Can Cut Costs, Pet. Week., Oct. 19, 1956, p. 31.
14. Early, et al., Better Refinery Maintenance and Turnaround, The Oil and Gas Journal, Oct. 4, 1954, p. 142.



Monthly Report on PIPELINE CONSTRUCTION

PIPELINE ACTIVITY reported here is compiled from surveys by The Oil and Gas Journal among pipeline companies and construction contractors.

This summary report appears in the last issue of the Journal each month. New construction projects are reported weekly in Pipeline Briefs in the Journal's news section.

Projects are listed in three groups —U. S., Canadian, and Foreign— and according to type of line—crude, products, or natural gas.

U. S. Crude Oil Pipelines

• **Cape Pipe Line Co.** (Sun Oil Co., Cities Service Co., Atlantic Refining Co.), Philadelphia.
Project: Line from lower Delaware Bay to Philadelphia.
Status: Planned.
Completion: 1960.

• **Gillette Pipeline, Inc.,** and **A. W. Hartwig, Inc.**
Project: A 102-mile line from Dead Horse Creek field to Casper, Wyo.
Status: Pending Wyoming Public Service Commission approval.

• **Great Northern Railway Co.**
Project: 400 to 600 miles of 12 to 20-in. from Williston basin in Mont. and N. D., to Clearbrook or St. Paul, Minn.
Contractor: **Pipe Line Technologists, Inc.,** Houston, has completed feasibility study.

• **Honolulu Oil Corp.** and six other companies.
Project: 28-mile crude line connecting Fourbear, Pitchfork, and Spring Creek fields in Wyoming.
Status: Pending approval of state public service commission.

• **Humble Oil & Refining Co.,** Houston.
Project: 15 miles of 10 and 12-in. line in Kleberg and Nueces counties.
Status: Planned.
Contractor: **O. R. Burden Construction Corp.,** Tulsa.

• **Husky Oil Co.,** Cody, Wyo.
Project: Gathering lines to the refinery at Cody.
Status: Planned.

• **International Oil Pipeline Corp.,** New York City.
Project: Would own U. S. section of 1,500-mile, 30-in. line proposed by Mid-Continent Pipe Lines, Ltd., from Edmonton, Alta., to Chicago. (See Canadian Crude-Oil Pipelines).
Status: Proposed.

• **Mid-Continent Pipe Line Co.,** Tulsa.
Project: Lines in Okla.: 3 miles of 10-in. from Duncan to Velma; 6 miles of 8-in. from Cromwell to Tiger Creek Junction; 5 miles of 6-in. from Key West to Beggs, 12 miles of 8-in. from Drumright to Tulsa; 7 miles of 4-in. from Key West to Davenport.
Status: Planned.
Completion: 1959.
Project: 100 miles of gathering line and trunk line to connect Northeast Cherokee, Mendon, West Mendon, Eureka, and North Roundhill fields in northwestern Oklahoma.
Status: Under way.
Contractors: **Jess Whitlow,** Ponca City, Okla., has contract for the gathering line, and **A. C. Holder Construction Co., Inc.,** Tulsa, has contract for the main line.

• **Service Pipe Line Co., Tulsa, Okla.**
Project: 9 miles of 10-in. from Snyder to Colorado City, Tex.
Status: Planned.
Completion: November 1959.

• **Standard Oil Co. of California,** San Francisco.
Project: Four lines to handle production from a platform 2.2 miles off coast of Summerland, Calif. Three of the lines will connect the platform and onshore tanks, and a 20-in. line will connect tanks to an offshore tanker mooring.
Status: Under way.
Contractor: **Morrison-Knudsen Co.,** San Francisco.
Completion: Fall 1959.

• **Teton Pipeline Co.,** Denver.
Project: 8 miles of 5-in. to connect O'Brien field, Carbon Co., Wyo., with the Sinclair Pipe Line system.
Status: Planned.

• **Texaco-Cities Service Pipe Line Co.,** Tulsa.
Project: About 12 miles of 12-in. in Oologah Dam area, northeastern Oklahoma.
Status: Planned.
Contractor: **O. R. Burden Construction Corp.,** Tulsa.

• **Texas Gas Transmission Corp.,** Owensboro, Ky.
Project: 19½ miles of 3½-in. line off Louisiana coast.
Status: Planned.

U. S. Products Pipelines

• **Badger Pipe Line Co., Bartlesville, Okla.**
Project: 2½-miles lateral from main Badger line to O'Hare Air Field in the Des Plaines, Ill., area near Chicago.
Status: Planned.

• **Buckeye Pipe Line Co., N. Y. C.**
Project: 100 miles of 8-in. from Wayne, Mich., to Flint and Owosso, Mich.
Status: Under way.
Project: 19.5 miles of 8-in. from Wayne to Trenton, Mich.
Status: Under way.
Contractor: **R. L. Coolsaet Construction Co.,** Dearborn, Mich.
Completion: Fall 1959.

• **Continental Pipe Line Co.,** Ponca City, Okla.
Project: 155 miles of 6-in. from Artesia, N.M, to El Paso, Tex.
Status: Under way.
Contractor: **R. H. Fulton & Co.,** Lubbock, Tex.
Completion: Nov. 1, 1959.

• **Florida Pipeline & Storage Co.,** Uniontown, Pa.
Project: 54 miles of 8-in. from Port Everglades to Homestead Air Force Base, Fla.
Status: Under way.
Contractor: **Ewin Engineering Corp.,** Washington, D.C., has engineering supervision contract.
Completion: Nov. 1, 1959.

• **Great Lakes Pipe Line Co.,** Kansas City, Mo.
Project: 64 miles of 12-in. from Iowa City to Princeton, Iowa, and 62 miles of 12-in. from Cordova to Lee Center, Ill.
Status: Under way.

• **Husky Oil Co.,** Cody, Wyo.
Project: Line from Cody to the Yellowstone products line west from Billings, Mont.
Status: Planned.

• **Kaneb Pipe Line Co.,** Houston.
Project: 111 miles of 6-in. from Phillipsburg, Kans., to Fairmont terminal near Geneva, Neb., and 168 miles of 6-in. from Fairmont to Yankton, S.D.
Status: Under way.
Contractor: **Williams Brothers Co., Tulsa.**
Completion: Fall 1959.

• **Katy and New York Central Railroads.**
Project: 2,500 miles of 10-in. and smaller LPG line from Houston through Kansas City, St. Louis, Indianapolis, and Cleveland to Syracuse, then down to New York City. A branch would go through Chicago to Detroit.
Status: Proposed.
Contractor: **Williams Brothers Co., Tulsa,** has completed feasibility study.

• **Texas Eastern Transmission Corp.,** Houston.
Project: A 10-mile, 12-in. line from Mont Belvieu terminal to Baytown, Tex.
Status: Planned.
Completion: Summer 1959.

U. S. Natural Gas Pipelines

• **Algonquin Gas Transmission Co.,** Boston, Mass.
Project: 26-in. line in vicinity of Danbury, Conn.
Contractor: **A. J. Curtis & Co.,** Hickory, Pa.
Completion: October 1959.
Project: 25 miles of 20-in. and 8 miles of 8-in. loop.
Status: Pending FPC approval.
Completion: Fall 1959.

• **Arkansas Industrial Pipeline Corp. (Arkansas Louisiana Gas Co.), Shreveport, La.**
Project: 130 miles of 18-in. from Perla to Helena, Ark.
Status: Planned.
Completion: 1959.

• **Arkansas Louisiana Gas Co., Shreveport, La.**
Project: 3 miles of 2-in., 58.5 miles of 4-in., and 2 miles of 6-in. gathering line.
Status: Planned in 1959.
Project: 77.4 miles of 6-in. transmission lines.
Status: Planned in 1959.

• **Atlantic Seaboard Corp.,** Charleston, W. Va.
Project: 19.8 miles of 26-in. loops in West Virginia and Virginia.
Status: Under way.
Contractor: **H. L. Gentry Construction Co.,** Jackson, Mich.

PIPELINE CONSTRUCTION

Completion: Fall 1959.
Project: 43.4 miles of 26-in. in W. Va.
Status: Under way.
Contractor: **Williams Brothers Co.**, Tulsa.
Completion: Summer 1959.

• **Central Hudson Gas & Electric Corp.**, Poughkeepsie, N. Y.
Project: 13 miles of 10-in. from Highland to Kingston (Part II), N. Y.
Status: Planned.
Completion: 1960.

• **Chicago District Pipeline Co.**
Project: 50 miles of 36-in. from Joliet to Chicago.
Status: Under way.
Contractor: **Contracting & Material Co.**, Evanston, Ill.
Completion: Fall 1959.

• **Cities Service Gas Co.**, Oklahoma City.
Project: 21.5 miles of 30-in. loop from Welda to Princeton, Kans.; 10.5 miles of 12-in. replacement and 14.7 miles of 12-in. loop from Hutchinson to Ellsworth, Kans.; 7.2 miles of 16-in. loop near Fort Scott, Kans.; 4.4 miles of 16-in. replacement west of Lawrence, Kans.; and 4.2 miles of 16-in. from Pierce City to Springfield, Mo.
Status: Under way.
Contractors: **Vaughn & Taylor Construction Co., Inc.**, Odessa, Tex., has contract for the Welda and Hutchinson jobs, and **Trojan Construction Co., Inc.**, Oklahoma City, has contract for the other jobs.
Completion: In August and September 1959.

• **Coastal States Gas Producing Co.**, Corpus Christi, Tex.
Project: 49 miles of 18-in. and 55 miles of 20-in. from Kelsey Base (Brooks) to Rodriguez field, La Salle County, Texas.
Status: Planned.
Contractor: **O. R. Burden Construction Corp.**, Tulsa.
Completion: Dec. 1, 1959.
Project: 60 miles of 10-in. in La Salle and Frio counties, Texas.
Status: Planned.
Completion: Jan. 1, 1960.

• **Colorado Interstate Gas Co.**, Colorado Springs, Colo.
Project: 109 miles of 26-in. from Four-Way station in Tex. Panhandle, to Morton Junction in southeastern Colo.; 135 miles of 34-in. from there to Pueblo, and 100 miles of 30-in. on to Denver; 148 miles of 34-in. from CIG line at Rock Springs, Wyo., to Provo, Utah, to connect with proposed El Paso Natural Gas Co.'s line to Calif.
Status: Planned.
Completion: January 1, 1960.

• **Colorado Oil & Gas Corp.**, Denver.
Project: 402-mile line from Gubik field to Fairbanks, Alaska.
Status: Proposed.

• **Columbia Gulf Transmission Co.**, Houston.
Project: 11 miles supply line connecting Block 17 field, East Cameron area, La.
Status: Approved.
Project: 10 miles of 12-in. supply loop to Erath field, Vermilion Parish, La., and 9 miles of various-size field lines in Acadia and Vermilion parishes, La.
Status: Approved.
Project: 10 miles of 20-in. loop in Jefferson Davis and Vermilion parishes, La., and 3 miles of 6-in. loop in Cameron Parish, La.
Status: Approved.
Project: 41 miles of 24-in. loop of east lateral in vicinity of Rayne, La.
Status: Pending FPC approval.
Completion: Fall 1959.

• **Commonwealth Natural Gas Corp.**, Richmond, Va.
Project: 17.6 miles of 12-in. from Wakefield to Windsor, Va.
Contractor: **Latex Construction of Georgia**, Atlanta.
Completion: Sept. 1, 1959.

• **Consumers Power Co.**, Jackson, Mich.
Project: 120 miles of 26-in. from Mich.-Ind. border connection with Trunkline Gas Co., to Plymouth, Mich., and 20 miles of 24-in. from Northville to Clarkston, Mich.
Status: Planned.
Contractor: **Cape Construction Co., Inc.**, Cape Girardeau, Mo.
Completion: Dec. 1, 1959.

• **Dow Chemical Co.**, Midland, Mich.
Project: About 60 miles of 2, 4, 12, and 20-in. line in the Midland, Mich., area.
Contractor: **Shamrock Construction Co.**, Lansing, Mich.

• **East Ohio Gas Co.**, Cleveland.
Project: 75 miles of 18-in. in Harrison, Mahoning, Columbiana, Carroll, and Belmont counties, Ohio.
Status: Under way.
Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, Houston.

• **El Paso Natural Gas Co.**, El Paso, Tex.
Project: 34.2 miles of 20-in. from Puckett, Tex., to Goldsmith plant; 51.3 miles of 20-in. from Terrell to Puckett Plant discharge; and 23 miles of 20-in. from Goldsmith to Eunice-Dumas line.
Status: Planned.
Completion: January 1960.
Project: 244 miles of 30-in. Permian-San Juan Line loops.
Status: Planned.
Completion: November 1959.
Project: 87 miles of gathering lines in Bisti field in San Juan Co., N. M.
Status: Has temporary FPC approval.
Project: 62-mile gathering system of 4½-10-in. in Beaver County, Okla.
Status: Pending FPC approval.
Completion: Fall 1959.
Project: 395 miles of 34-in. from Salt Lake City, to Calif. border near Las Vegas, Nev.
Status: Pending FPC approval.

• **Equitable Gas Co.**, Pittsburgh.
Project: 12.5 miles of 16-in. in W. Va.
Status: Under way.
Contractor: **Harford Brothers**, Emporium, Pa.
Completion: November 1, 1959.
Project: 15.3 miles of 16-in., 3 miles of 20-in. in W. Va. and Pa.
Status: Planned.
Completion: Fall 1960.
Project: 14.7 miles of 16-in., 5.9 miles of 20-in. in Pa.
Status: Planned.
Completion: Fall 1961.
Project: 17.25 miles of 20-in. in Pa.
Status: Planned.
Completion: Fall 1962.

• **Gulf Resources, Inc.**, New York.
Project: 136 miles of 14 and 20-in. from Hidalgo County to LaSalle County, Texas.
Status: Pending FPC approval.

• **Hope Natural Gas Co.**, Clarksburg, W. Va.
Project: 20 miles of 24-in. line in Wetzel and Monongalia counties, W. Va., replacing two 16-in. lines.
Status: Approved.
Project: 45-mile line from W. Va. to Pittsburgh area.
Status: Planned.
Completion: Fall 1959.

• **Houston Pipe Line Co.**, Houston.
Project: 31 miles of 12-in. and 6 miles of 24-in. near Beaumont, Tex.
Status: Under way.
Contractor: **Houston Contracting Co.**

• **Humble Oil & Refining Co.**, Houston.
Project: 42 miles of 20 and 24-in. from King Ranch gas plant to Alazan Creek.
Contractor: **H. B. Zachry Co.**, San Antonio, Tex.
Completion: September 10, 1959.

• **Iron Ranges Natural Gas Co.**, St. Paul.
Project: 79 miles of 10 and 12-in. from Grand Rapids to Hoyt Lake, Minn., and 67 miles of 12-in. from Duluth to Silver Bay, Minn.
Status: Approved by FPC.
Completion: Fall 1959.

• **Iroquois Gas Co.**
Project: 9.5 miles of 16-in. in Erie County, N. Y.
Status: Pending FPC approval.

• **Kansas-Nebraska Natural Gas Co., Inc.**, Phillipsburg, Kans.
Project: 15.5 miles of 12-in. loop in northwestern Kansas.
Status: Planned.
Completion: Oct. 1, 1959.

• **Laclede Gas Co.**, St. Louis, Mo.
Project: 107 miles of 24-in. between Hallsville, Mo., and St. Louis.
Status: Proposed.

• **Lone Star Gas Co.**, Dallas.
Project: About 7 miles of 10-in. lateral from North Doyle dehydration plant in Stephens County, Oklahoma, to Carter-Knox field, Grady County.
Status: Planned.
Project: 4.7 miles of 24-in. in Dallas County.
Status: Planned.
Contractor: Company crews.
Completion: Sept. 1, 1959.
Project: 12.4 miles of 20-in. from Parker County to Fort Worth.
Status: Scheduled for completion this summer.

• **Lone Star Gas Co. and Coastal States Gas Producing Co.**
Project: 37 miles of gathering line in North Texas.
Status: Planned.

• **Manufacturers Light & Heat Co.**
Project: 61 miles of 20-in. (to replace 135 miles of old 6-in.).
Status: Under way.
Contractor: **Harford Bros.**, Emporium, Pa.
Completion: Fall 1959.
Project: 10.4 miles of 8-in. replacement from Uniontown to Connellsville, Pa.
Status: Planned.
Contractor: **Wilkie Contracting Co.**
Completion: Sept. 30, 1959.

• **Michigan Consolidated Gas Co.**, Detroit.
Project: 53 miles of 30-in. from near Milford to Elsie in Clinton County, Mich.
Status: Under way.
Contractor: **Williams Brothers Co.**, Tulsa.
Completion: Summer 1959.

• **Michigan Wisconsin Pipe Line Co.**, Detroit.
Project: 20 miles of 16-in. loop in Wisconsin.
Status: Pending FPC approval.
Completion: Oct. 1, 1959.
Project: 134.4 miles of 24-in., 27.9 miles of 20-in., 96.3 miles of 16-in., and 118 miles of smaller diameter lines, in Wisconsin and Michigan.
Status: Pending FPC approval.
Completion: 1960.

• **Midwestern Gas Transmission Co.**, Houston.
Project: 350 miles of 30-in. from Portland, Tenn., to Joliet, Ill.
Status: Under way.
Contractors: **Sharman, Allen, Gay & Taylor, Inc.**, Houston, 43 miles in Kentucky; **Panama, Inc.**, Houston, 53 miles in Indiana; **Majestic Contractors, Ltd.**, Edmonton, Alta., 53 miles in Indiana; and **Bechtel Corp.**, San Francisco, 148 miles in Indiana and Illinois.
Completion: Fall 1959.
Project: 504 miles of 24-in. from Emerson, Man., to Marshfield, Wis., plus 54 miles of sales laterals.
Status: Pending FPC approval.
Completion: 1960.

• **Mississippi River Transmission Corp.**

PIPELINE CONSTRUCTION

(Mississippi River Fuel Corp.), St. Louis.

Project: 115 miles of 24-in. from near Oran in southeast Mo., north between Ste. Genevieve and Bonne Terre into vicinity of Herculaneum and Pevely then into St. Louis Co.

Status: Planned.

Completion: Last half 1960.

• **Montana-Dakota Utilities Co.**, Minneapolis, Minn.

Project: 16 miles of 6-in. line from Tampico, Mont., to Glasgow Air Force Base, Mont.

Status: Approved by FPC.

Completion: Sept. 1, 1959.

• **Monterey Pipeline Co.**, Los Angeles, Calif.

Project: 37.5 miles of 8 and 14-in., and dual Mississippi River crossings in St. James and Lafourche parishes, Louisiana.

Status: Under way.

Contractor: **Houston Contracting Co.**

Completion: September 1959.

• **Mountain Fuel Supply Co.**, Salt Lake City.

Project: 24.4 miles of 20-in. loop from Yellow Creek, Wyo., to Coalville, Utah, plus about 7 miles of 6 and 8-in. south of Rock Springs, Wyo.

Status: Pending FPC approval.

Contractor: **Hood Construction Co.**, Whittier, Calif., has contract for the Yellow Creek project.

Completion: Oct. 15, 1959, on the Yellow Creek project and Sept. 1, 1959, on the Rock Springs project.

• **Natural Gas Pipeline Co. of America**, Chicago.

Project: 29 miles of 10-in. lateral from Enville and Southwest Enville fields, Love County, Oklahoma.

Status: Planned.

Project: Nearly 4 miles of 4-in. sales lateral in Adair and Union counties, Iowa.

Status: Scheduled for completion Aug. 28, 1959.

Pittsburgh.

• **New York State Natural Gas Corp.**,

Project: 37 miles of 20-in. in Pennsylvania.

Completion: September 1959.

Project: 14.5 miles of 26-in. from Chatham Township to Lawrenceville, Pa.

Status: Planned.

Completion: 1959.

• **Northern Illinois Gas Co.**

Project: 140 miles of 22-in. from Des Plaines to East Dubuque, Ill.

Status: Under way.

Contractor: **Contracting & Material Co.**, Evanston, Ill.

• **Northern Natural Gas Co.**, Omaha, Neb.

Project: 217 miles of main line, 221 miles of main-line loops, and 2,178 miles of branch lines of various diameters.

Status: Approved by FPC.

Completion: 1959-60.

Project: 72 miles of 24-in. and 98.8 miles of 20-in. in Minnesota.

Contractors: **R. H. Fulton & Co.**, Lubbock, Tex., and **Williams Brothers**, Tulsa.

Project: 103 miles of 30-in. loop lines in Iowa, Nebraska, and Kansas.

Status: Under way.

Contractor: **R. H. Fulton & Co.**, Lubbock, Tex.

Completion: October 27, 1959.

Project: 36.5 miles of 2 to 16-in. gathering lines at Otis gas field, Kansas, for underground storage, and 36.7 miles of 30-in. transmission line connecting Otis storage area to main line at Bushton, Kans.

Status: Pending FPC approval.

Project: 188 miles of 24-in. and 215 miles of 30-in. from Farmington, Minn., to International border.

Project: 8 miles of 30-in. main line loop north of Ventura, Iowa, and 22 miles of branch lines near Marshalltown and Griswold, Iowa.

Status: Approved by FPC.

• **Offshore Gathering Corp.**, Houston.

Project: 364 miles in Gulf of Mexico off La.: 60 miles of 24-in., 70 miles of 26-in., and 234 miles of 30-in. dual line.

Status: Pending FPC approval.

• **Ohio Fuel Gas Co.**, Columbus, Ohio

Project: About 30 miles of 18 through 24-in. in various locations in Ohio.

Contractor: **Shamrock Construction Co.**, Lansing, Mich.

Project: 9-mile extension of 24-in. line in Seneca County, Ohio.

Status: Planned.

Contractor: **Shamrock Construction Co.**, Lansing, Mich.

Completion: September 1959.

• **Oklahoma Natural Gas Co.**, Tulsa.

Project: 10½ miles of 8-in. in Grady County, Oklahoma.

Status: Planned.

Completion: Nov. 1, 1959.

• **Pacific Gas & Electric Co.**, San Francisco.

Project: 120 miles of 34-in. looping of Topock-Milpitas main line.

Status: Planned. Pending FPC approval.

Completion: 1960-61.

Project: 42 miles of 30-in. from Pittsburg to Irvington, Calif.

Status: Planned.

Completion: 11 miles in 1959; 31 miles in 1960.

Project: 296 miles of 36-in. from Klamath Falls, Ore., to Antioch, Calif.

Status: Pending Canadian export permit and FPC approval.

Completion: 1961.

• **Pacific Gas Transmission Co.** (Pacific Gas & Electric, San Francisco).

Project: 614 miles of 36-in. from Kingsgate, B. C., to California border near Klamath Falls, Ore.

Status: Pending approval of FPC and Canadian authorities to import gas. To start late 1959.

• **Pacific Lighting Gas Supply Co.**, Los Angeles.

Project: 128 miles of 34-in. from Topock, Ariz., to Newberry, Calif.

Status: California Public Utilities Commission has granted certificate contingent upon FPC approval of Transwestern Pipeline Co.'s proposed project terminating at Topock, Ariz.

Completion: November 1, 1959.

• **Pacific Northwest Pipeline Corp.**, Salt Lake City.

Project: 17 miles of 30-in. loop of Spokane-Coeur d'Alene lateral.

Status: Pending FPC approval.

Completion: 1961.

• **Panhandle Eastern Pipe Line Co.**, Kansas City.

Project: 16 miles of 10, 13 miles of 6, 40 miles of 4, and 1 mile of 2-in. gathering line.

Status: Planned.

Contractor: **Hall Construction Co.**

Completion: Dec. 31, 1959.

Project: 22 miles of 4-in., 7 miles of 6-in., and 8 miles of 8-in. gathering lines.

Status: Planned.

• **Pennsylvania Gas Co.**, Warren, Pa.

Project: 23 miles of 10-in. in Erie Co., Pa., 15 miles of 8-in. in Warren and Chautauqua counties, Pa.; 30 miles of branch lines, and several small distribution lines.

Status: Approved.

• **Peoples Natural Gas Co.**, Pittsburgh.

Project: 30 miles of 20-in. from Bentleyville to Imperial, Pa.

Status: Under way.

Contractor: **Joyce Western Corp.**, Olean, New York.

Completion: Oct. 1, 1959.

Project: 25 miles of 24-in. from Waynesburg, Pa., to W. Va. line near Garrison, Pa.

Status: Under way.

Contractor: **H. L. Gentry Construction Co.**, Jackson, Mich.

Completion: September 1, 1959.

• **Permian Basin Pipeline Co.**, Omaha, Neb.

Project: 83 miles of 16-in. from the Pioneer gathering line in Schleicher County, Tex., to Spraberry, Tex.

Status: Pending FPC approval.

Completion: Fall 1959.

• **Phillips Petroleum Co.**, Bartlesville, Okla.

Project: Undetermined mileage of gathering lines, Garvin County, Okla.

Contractor: **George W. Davis.**

Completion: Oct. 1, 1959.

Project: Gathering lines in Lea and Eddy counties, New Mexico.

Status: Planned.

Completion: Indefinite.

Project: 5 miles of 24-in. gathering line in Sherman County, Texas.

Status: Planned.

Completion: Indefinite.

• **Piedmont Gas Co.**, Hickory, N. C.

Project: 78 miles of 2 to 8-in. extension off Transcontinental in N. C., to serve Gaston, Lincoln, Catawba, Caldwell, and Burke counties.

Status: Approved.

• **Pioneer Natural Gas Co.**, Amarillo Tex.

Project: 21 miles of 12-in. from Sudan to Muleshoe, Tex.

Status: Pending FPC approval.

Project: 12 miles of 10-in. from Muleshoe, Tex., northward.

Status: Pending FPC approval.

• **Richfield Oil Corp.**, Los Angeles

Project: 60 miles of 20-in. from Cuyama Valley to Ventura, Calif.

Status: Under way.

Contractor: **Alex Robertson Co.**, Paramount, Calif.

Completion: Fall 1959.

• **Rio Gas Gathering Co.**, San Antonio, Tex.

Project: 97 miles of 3 to 8-in. gathering line in Hidalgo County, Tex.

Status: Pending FPC approval.

Completion: 1959.

• **Signal Oil & Gas Co.**, Los Angeles.

Project: Extension of gathering system from Tioga, N. D., to near the Canadian border in Burke Co.

Status: Proposed.

• **South Georgia Natural Gas Co.**, Thomasville, Ga.

Project: Lines in Ga.: 2 miles of 2-in. near Meigs; 31 miles of 3-in. near Nashville; 41 miles of 4-in. and 39 miles of 6-in. near Tifton.

Status: Planned.

Contractor: **Coates Field Service, Inc.**, and **Lockwood, Kessler & Bartlett, Inc.**, have contract for aerial photography, surveying, mapping, and right-of-way acquisition.

Completion: Summer 1959.

• **South Texas Natural Gas Gathering Co.** (Coastal States Gas Producing Co., Corpus Christi, Tex.)

Project: A 60-mile line from existing system to steam generating plant in Pearsall County, Tex.

Status: Planned.

Completion: January 1960.

• **Southern California Gas Co. and Southern Counties Gas Co.**, Los Angeles.

Project: 106 miles of 36-in. and 11 miles of 34-in. from Newberry to Placentia, Calif., and 91 miles of 34-in. from Newberry to Ivanpah Lake.

Status: Planned.

Completion: Late 1959 and in 1960.

PIPELINE CONSTRUCTION

• **Southern Natural Gas Co.**, Birmingham, Ala.

Project: 47.9 miles of 16-in. from Montegut field to Toca station and 6.4 miles of 6-in. from South Lake Long field to Montegut field.

Status: Approved.

Completion: Nov. 1, 1959.

Project: 44.9 miles of 24-in., and 65.6 miles of 20-in., Gwinville-Ocmulgee station; 79 miles of 16-in., Ocmulgee-Wrens station; 21.8 miles of 14-in., Griffin-South Atlanta; 78.9 miles of 18-in., Gwinville-Cranfield field; 17.1 miles of 20-in., main line to Toca station; 2.3 miles of 12-in., Coffee Bay field to Lake Enfermer lateral; 5 miles of 8-in., Sandy Hook field lateral loop; 6.4 miles of 6-in. and 47.9 miles of 16-in. from South Lake Long field to Toca compressor station.

Status: Approved by FPC.

Completion: Nov. 1, 1959.

Contractors: Contracts have been awarded for some 300 miles of line to **Oklahoma Contracting Co.**, Dallas; **Harbert Construction Corp.**, Birmingham, Ala.; **Buchanan Contracting Co.**, Birmingham; and **C. S. LeNoir Construction Co.**, Austin, Tex.

• **Tennessee Gas Pipeline Co.**

Project: 70 miles of 30-in. from Portland, Tenn., to Greensburg, Ky.

Status: Under way.

Contractor: **Williams Brothers Co.**, Tulsa.

Project: 72 miles of 30-in. in Kentucky.

Status: Under way.

Contractor: **Western Pipe Line, Inc.**, Austin, Tex.

Completion: October 1, 1959.

Project: About 30 miles of 30-in. in Kentucky and 28 miles of 26-in. in Kentucky and West Virginia.

Status: Under way.

Contractor: **H. C. Price Co.**, Bartlesville, Okla.

• **Tensas Gas Gathering Corp.**

Project: 37 miles of 2 to 8-in. from Rodney field, Miss., westerly to connect with Olin Gas Transmission Co.'s line in Tensas Parish, La.

Status: Approved.

• **Texas Eastern Transmission Corp.**, Shreveport, La.

Project: 13 miles of 30-in. from Grennup Co., Ky., to Scioto Co., Ohio; 16 miles of 30-in. from Noble Co. to Monroe Co., Ohio.

Status: Pending FPC approval.

Completion: 1959.

Project: 81 miles of 24-in. from Leidy, Pa., to Oakford-Lambertville, N. J., line; 65.5 miles of 30-in. loop of Oakford line; 40 miles of 36-in. loop and 3.5 miles of 30-in. loop between Lambertville and Staten Island; and 23 miles of 20-in. loop of Philadelphia lateral.

Status: Pending FPC approval.

Completion: Fall 1959.

• **Texas Electric Service Co.**, Fort Worth, Tex.

Project: 290-mile 22 or 24-in. line from Old Ocean field, Brazoria County, Texas, to Fort Worth, and 70-mile 16-in. line from there to Graham, Tex.

Status: Planned.

Completion: Fall of 1960.

• **Texas Gas Transmission Corp.**, Owensboro, Ky.

Project: 72 miles of 30-in. line in Louisiana and Arkansas.

Status: Under way.

Contractor: **Houston Contracting Co.**

Completion: Nov. 1, 1959.

Project: About 164 miles of 30-in. in Kentucky, Tennessee, Louisiana, Arkansas, and Mississippi.

Status: Under way.

Contractor: **Western Pipe Line, Inc.**, Austin, Tex., has contract for 93 miles of this project.

Project: 81.7 miles of 26-in. in Kentucky, Indiana, and Ohio, and 6.9 miles of 12-in. near Dixie, Ky.

Status: Under way.

Contractor: **Western Pipe Line, Inc.**, Austin, has contract for the 26-in. line.

Project: 93 miles of supply lines in Louisiana and adjacent offshore areas.

Status: Under way.

• **Texas Illinois Natural Gas Pipeline Co.**, Chicago.

Project: 371 miles of 30-in. loop of present system between Texas and Chicago.

Status: Pending FPC approval.

Completion: 1960.

Project: 10.6 miles of 8-in. line in Starr and Hidalgo counties, Texas.

Status: Pending FPC approval.

• **Transcontinental Gas Pipe Line Corp.**, Houston.

Project: 58 miles of 36-in. main line loop in New Jersey.

Status: Under way.

Contractors: **H. C. Price Co.**, Bartlesville, Okla., has contract for 39 miles from near Centerville to a point near Clifton, N. J., and **J. P. Neill & Co., Inc.**, Dallas, has contract for 10 miles between Clifton and Nutley, N. J.

Completion: 1959.

Project: 29 miles of 30-in. main line loop in Pennsylvania.

Status: Under way.

Contractor: **Panama - Williams Corp.**, Houston.

Completion: 1959.

Project: 127 miles of 20-in. and under, of gas purchase laterals in Louisiana.

Status: Under way.

Contractor: **Great Lakes Dredge & Dock Co.**

Completion: 1959.

Project: 314 miles of 24-in. and under, Southeast Louisiana gathering system.

Status: Under way.

Completion: 1959.

Project: 38 miles of 30-in. main line loop.

Status: Pending FPC approval.

Contractor: **H. L. Gentry Construction Co.**, Jackson, Mich.

Completion: 1959.

Project: 74 miles of 36-in. main line loop.

Status: Pending FPC approval.

Contractor: **Samuel Gallucci & Sons, Inc.**, Long Island, N.Y.

Completion: 1959.

Project: 45 miles of 30-in. and 78 miles of 36-in. main line loop.

Status: Pending FPC approval.

Completion: 1960.

Project: 18 miles of 20-in. main line loop.

Status: Approved by FPC.

Completion: 1959.

Project: 53 miles of 24-in. and under, gas purchase laterals in Louisiana.

Status: Pending FPC approval.

Completion: 1959.

• **Transwestern Pipe Line Co.** (Warren Petroleum, Monterey Oil Co., J. R. Butler), Houston.

Project: 635 miles of 24-in. from Perryton and Fort Stockton, Tex., to Roswell, N. M., and 670 miles of 30-in. from Roswell to Topock, Ariz.

Status: Approved by FPC.

• **Trunkline Gas Co.**, Houston, Tex.

Project: 48 miles of 16-in. and 31 miles of 4 to 12-in. gathering line from Hitchcock to Katy, Tex.

Contractor: **H. H. Null, Inc.**

Project: 24.5 miles of 12-in. gathering line from Lowry, La., to Cameron Parish shoreline.

Contractor: **Sam Carline, Inc.**, Berwick, La.

Projects: 6.6 miles of 12-in. gathering line to Block 67, Cameron Parish, Louisiana; 19.6 miles of 16-in. in marsh and 5.3 miles of 14-in. in Gulf to Block 26, Vermilion Parish; and 41.9 miles of 24-in. loop from west of Moss Hill, Tex., to Silsbee, Tex.

Contractor: **Sharman, Allen, Gay & Taylor, Inc.**, Houston.

Project: 43.3 miles of 4 to 20-in. gathering line from Lowry, La., toward shoreline, Vermilion Parish.

Contractor: **Western Pipe Line, Inc.**, Austin.

Completion: September 10, 1959.

Project: 53.3 miles of 30-in. loop from Pitkin, La. to Pollock, La.

Contractor: **Grayco Constructors, Inc.**, Austin, Tex.

Project: 61.4 miles of 30-in. loop from Pollock, La., to pipe line valve 63.

Contractor: **APV Co., Inc.**

Projects: 118 miles of 30-in. loop from Kilbourne, La., to Ballentin, Miss., and 60 miles of 30-in. from Brownsville, Tenn., to Canadaville, Tenn., and from Bardwell, Ky., to Polk, Tenn.

Contractor: **Panama, Inc.**, Houston.

Project: 57 miles of 30-in. loop from Polk, Tenn., to Brownsville, Tenn.

Contractor: **C. S. LeNoir Construction Co.**, Austin.

Project: 112.5 miles of 30-in. from Marion, Ill., to Neoga, Ill.

Contractor: **Panama - Williams Corp.**, Houston.

Project: 62.2 miles of 26-in. extension from Tuscola, Ill., to Rossville, Ill.

Contractor: **Contracting & Material Co.**, Evanston, Ill.

Project: 136.6 miles of 26-in. extension from Rossville, Ill., to Vistula, Ind.

Contractor: **Engineers Limited Pipeline Co.**, San Francisco, Calif.

Completion: Work is under way on the above-mentioned Trunkline projects with completion expected by the end of 1959.

• **United Fuel Gas Co.**, Charleston, W. Va.

Project: 18½ miles of 26-in. in Kanawha County, West Virginia.

Status: Under way.

Contractor: **Engineers Limited Pipeline Co.**, San Francisco.

• **United Gas Pipe Line Co.**, Shreveport, La.

Project: 200 miles of 30-in. line from Southeast Louisiana to Mobile.

Status: Scheduled for completion by Aug. 1, 1959.

Contractors: **Williams Brothers Co.**, Tulsa; **Pentzian, Inc.**, Omaha, Neb.; **O. R. Burden Construction Co.**, Tulsa; **Hallmac Construction Co.**, Houston; and **Houston Contracting Co.**

Project: 14 miles of 12-in. to connect North Henderson field area, Rusk County, Texas.

Status: Planned.

Project: 27 miles of 20-in. in South Louisiana gathering system.

Status: Under way.

Contractor: **Houston Contracting Co.**

Completion: Fall 1959.

Project: 20 miles of 16-in. lateral in Louisiana.

Status: Approved by FPC.

Project: 8.7 miles of 30-in. line paralleling part of existing line from Agua Dulce field, Texas, which will be submerged by flood-control program.

Status: Pending FPC approval.

• **Valley Gas Transmission, Inc.** (Fish Engineering Corp.), Houston.

Project: 150 to 160 miles of 3 to 6-in.

PIPELINE CONSTRUCTION

gathering lines to tap fields in Starr, Hidalgo, Brooks, and Jim Wells counties, Tex.
Status: Pending FPC approval.
Completion: 1959.

• **Western Slope Gas Co.**, Denver.
Project: 106 miles of 4, 6, and 8-in. line in Grand Junction, Colo., area.
Contractor: **A. J. Curtis & Co.**, Hickory, Pa.
Completion: Undetermined.

Canadian Crude Oil Pipelines

• **Act Oils, Ltd.**
Project: A 450-mile line from the Peace River region of northern B. C. to tidewater at Kitimat, B. C.
Status: Pending British Columbia Government approval.

• **Bituminous Oil Pipeline Co.** (Royalite Oil Co., and Can-Amera Oilsands Development, Ltd.)
Project: A 250-mile line from Athabasca oil sands in northeastern Alta., to Edmonton.
Status: Proposed.
Completion: 1960.

• **Federated Pipe Line Co., Ltd.**, Calgary, Alta.
Project: 40 miles of 4 to 10-in. gathering lines in Virginia Hills, Judy Creek, and Sara Lake fields.
Status: Under way.
Contractor: **Mannix Co., Ltd.**, Calgary.
Completion: End of September 1959.

• **Gibson Crude Oil Purchasing Co., Ltd.**, Calgary.
Project: 180-mile 8-in. line from Milligan Creek, B. C., to Grand Prairie, Alta.
Status: Permit sought from B. C. government.

• **Independent Pipe Line Co.** (Home Oil Co.), Calgary.
Project: 1,073 miles of 36-in. from Edmonton, Alta., to Superior, Wis.; 946 miles of 34-in. from Superior to Montreal, Que.; 72 miles of 16-in. and 74 miles of 10-in. feeder lines from Calgary to Bellshill Lake, Alta., on the 36-in. line.
Status: Proposed.

• **Mid-Continent Pipe Lines, Ltd.**, Edmonton, Alta.
Project: 1,500 miles of 30-in. from Edmonton to Chicago, via Sask., N. D., Minn., Wis., and Ill. U. S. section to be owned by International Oil Pipeline Corp., New York City.
Status: Pending Canadian Board of Transport Commission approval. **W. C. Gilman & Co.**, New York City, has made preliminary study.

• **Peace River Oil Pipe Line Co., Ltd.**, Calgary, Alta.
Project: 130-mile 12-in. line from Virginia Hills through Windfall to the main line linking with Trans Mountain Pipe Line in Alberta.
Status: Pending government approval.
Project: 8 miles of 6-in., 45 miles of 8-in., and 17 miles of 12-in. from its Fox Creek Pump Station to Windfall, Virginia Hills, and Swan Hills fields in Alta.
Status: Approved.
Project: 220-mile, 8-in. line from Milligan Creek field, B. C., to Dawson Creek, B. C., and Sturgeon Lake, Alta.
Status: Permit sought from B. C. government.
Completion: Nov. 1, 1959.
Pembina Pipe Line, Ltd., Drayton Valley, Alta.
Project: 40 miles of 3, 4, and 6-in. gathering line in Pembina field.
Contractor: **Mannix Co., Ltd.**
Completion: November 1959.

• **Producers Pipelines, Ltd.**, Regina, Sask.
Project: 25-mile 4-in. line to connect Parkman Mississippian pool in southeast Saskatchewan.
Status: Pending approval of Saskatchewan government.

• **Rangeland Pipe Line Co.**, Calgary.
Project: 111-mile line from Cessford field to Calgary.
Status: Pending approval of Alberta government.

• **Trans-Prairie Pipelines, Ltd.**, Edmonton, Alta.
Project: 6-8-in. line from Weyburn field to Regina and Moose Jaw, Sask.
Status: Proposed.

Canadian Products Pipelines

• **Foothills Products Pipe Line, Ltd.** (Pembina Pipe Line Co., Mannix Co., Ltd.), Calgary, Alta.
Project: Gathering system to connect Alta. gasoline plants to trunk line from Alta. to Pacific Coast.
Status: Proposed.

• **Hydrocarbons Pipeline Co.**, Winnipeg, Man.
Project: 800 miles of 6, 8-in. LPG line from near Edmonton to Fort William, Ont.
Status: Has Parliament of Canada approval. Seeking approval of Federal Board of Transport Commissioners and the Alberta Petroleum and Natural Gas Conservation Board.
Contractor: **Dutton - Williams Brothers, Ltd.**, Calgary, and **A. D. Little Co.**, Boston, are consultants.

• **Pembina Pipe Line, Ltd.**, Edmonton, Alta.
Project: A 1,200-mile line to carry sulfur, LPG, and natural gasoline from Alta.'s gas fields to eastern Canada.
Status: Proposed.

Canadian Natural Gas Pipelines

• **Alberta Gas Trunk Line Co., Ltd.**, Calgary.
Project: 122 miles of 30-in. from Princess to Torrington, Alta.; 152 miles of 6 to 16-in. at various locations.
Status: Under way.
Contractor: **Mannix Construction Co., Ltd.**, Calgary, has 122 miles of 30-in.; **Marine Pipeline & Dredging, Ltd.**, Vancouver, has 46 miles of 16-in. from Torrington junction to Nevis, 33 miles of 16-in. from Torrington to Carstairs, and the 1,000-ft. Red Deer River crossing at Nevis. **Engelking & James, Ltd.**, Calgary, has contract for 55 miles of lateral, including 21 miles in the Wayne, Makepiece, and Chancellor areas; 6 miles of 8-in. in the Consort area; and 28 miles of 8-in. in the Hilda area.
Completion: September 30, 1959.
Project: 256 miles of 36-in., 75 miles of 30-in., 55 miles of 26-in., 199 miles of various diameter gathering lines, and 42 miles of 16-in. delivery lateral.
Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

• **Alberta Natural Gas Co., Ltd.** (Pacific Gas & Electric Co., San Francisco, and **Westcoast Transmission**, Calgary).
Project: 108 miles of 36-in. across southeastern British Columbia to U. S. border near Kingsgate, B. C.
Status: Pending approval of Canadian and U. S. regulatory agencies. To start late 1959.

• **British Columbia Electric Co.**
Project: 35 miles of 30-in. from Huntington, B. C., to Vancouver.
Status: Planned.
Completion: 1960.

• **Cartier Gas Corp.** (St. Maurice Gas, Inc., and Consumers' Gas Co., Toronto).
Project: 170 miles from Montreal to Quebec City.

IN CANADA

C-I-L supplies all modern commercial explosives and accessories for pipeline construction.

Specialized knowledge of Canadian conditions — terrain, rock formations, climate, etc. — is at your service when you use

EXPLOSIVES
BLASTING AGENTS AND ACCESSORIES
MADE IN CANADA BY

C-I-L Explosives
"Everything for Blasting... Everywhere in Canada"
Canadian Industries Limited, P.O. Box 10, Montreal

S. E. HUEY & CO.
ENGINEERS & SURVEYORS
OUACHITA BANK BLDG.
MONROE, LA.
SURVEYING & MAPPING
PIPE LINE SURVEYS

OPERATORS
Specialists in
REFINERY & CHEMICAL PLANT
• START UPS
• PERFORMANCE TEST RUNS
• CONTINUOUS PLANT OPERATION
Immediate service—for any time desired. Brochure and staff resumes on request.
PROCESS OPERATORS, INC.
2635 South Main Phone CA 4-1896
Houston, Texas

PIPELINE CONSTRUCTION

Status: Proposed.

• **Northern Natural Gas Co.**, Omaha
Project: 73 miles of 20-in. from Savanna Creek to Pincher Creek, Alta.
Status: Planned.
Project: 32 miles of 24-in. from Pincher Creek to Mont. border to tie in with planned U. S. line on to Minneapolis.
Status: Planned.

• **Saskatchewan Power Corp.**, Regina, Sask.
Project: 76 miles of 6-in. from St. Louis to Tisdale, Sask.
Status: Under way.
Contractor: **Marine Pipeline & Dredging, Ltd.**, Vancouver.
Completion: By September 1, 1959.
Project: 79 miles of 10-in. from Success to Rosetown.
Status: Under way.
Contractor: **Dutton - Williams Brothers, Ltd.**, Calgary.
Completion: September 15, 1959.
Project: 24 miles of 8-in. from Wilkie to Unity.
Status: Under way.
Contractor: **Robb Construction, Ltd.**, Regina.
Completion: Late August 1959.

• **Trans-Canada Pipe Lines, Ltd.**, Toronto.
Project: 500 miles of main-line loops.
Status: Planned.
Completion: Late 1962.

• **Van Tor Oil & Exploration Co.**, Vancouver, B. C.
Project: Line from B. C. mainland to Vancouver Island.
Status: Proposed.
Completion: 1960.

• **Westcoast Transmission Co., Ltd.**, Calgary.
Project: 22-mile extension to connect reserves to be developed in the Jedney and Bubbles area of the Peace River region, British, Columbia.
Status: Planned.
Project: (See Alberta Natural Gas Co., Ltd., for joint project).

Foreign Crude Oil Pipelines

• **Arab Pipeline.**
Project: 1,250-mile 40-in. pipeline from the Persian Gulf to Mediterranean serving fields in Saudi Arabia, Kuwait, Iran, and Iraq.
Status: Proposed by Saudi Arabian Government as project of Arab countries.

• **Arabian American Oil Co.**, Dhahran, Saudi Arabia and N.Y.C.
Project: 63 miles of 30, 32-in. from Khursaniyah to Ras Tanura.
Status: Planned.
Contractor: Company personnel.
Completion: January 1, 1960.
Project: 18 miles of 34, 36-in. from Qatif to Ras Tanura.
Status: Planned.
Contractor: Company personnel.
Completion: July 1, 1962.
Project: 6 miles of 30-in. from Ras Tanura to Ras Tanura terminal; 4 miles of 14-in. from Buqqa to QA-2 pipeline.
Status: Planned.
Contractor: Company personnel.
Completion: October 1, 1960.

• **Assam Oil Co.**, Digboi, Lakhimpur District, Assam, India.
Project: 600 miles of 20-in. from Nahorkatiya field in Upper Assam to Barauni, India, to connect with Burmah Oil Co.'s proposed 250-mile line from Barauni to Calcutta.
Status: Planned.

• **Basrah Petroleum Co.**
Project: 70 miles of 30 and 32-in from Zubair to Fao, Iraq.
Status: Planned.
Completion: 1961.
Project: Two 32-in. submarine lines from Fao, Iraq, to island 26 miles out in Persian Gulf.
Status: Under way.
Contractor: **Collins Submarine Pipelines Overseas, Ltd.**, Port Lavaca, Tex.
Completion: Summer 1959.

• **Bolivia-Paraguay.**
Project: 500 miles of 6-in. from Southeast Bolivia to a proposed refinery on Paraguay River, and later to Asuncion.
Status: Planned.

• **British Petroleum, Ltd.**
Project: 60 miles of 18-in. across South Wales, from Milford Haven to the Llandarcy refinery.
Status: Under way.
Completion: Late 1959.

• **Burmah Oil Co., Ltd.**, Glasgow, Scotland.
Project: 250 miles of 20-in. from Barauni to Calcutta, India, extending Assam Oil Co.'s proposed line.
Status: Survey under way.

• **C.R.E.P.S., Societe Nationale de Recherche et d'Exploration des Petroles en Algerie (SN Repal)** and **Cie. Francaise des Petroles Algerie**, Paris, France.
Project: 470 miles of 24-in. from Edjele fields in southeastern Algeria to the Tunisian Mediterranean coast.
Status: Preliminary work under way.
Contractor: **TRAPSA** (transportation subsidiary of CREPS), with technical assistance and supervision of the project by **Bechtel Mediterranean** (subsidiary of Bechtel Corp., San Francisco).
Completion: September 1960.

• **Elburz Oil Corp.**
Project: 1,000 miles of 38-in. to move Qum crude to the Mediterranean.
Status: Planned.

• **ENI (Italian state oil agency)** and **Italo-Swiss Finance Co.**
Project: 250-miles of 24-in. and smaller diameters from Genoa to Aigle, Switzerland.
Status: Planned.
Completion: 1961.

• **Iranian Oil Exploration & Producing Co.**
Project: 26 miles of 30-in. from Ganaweh, Iran, to Kharg Island.
Status: Under way.
Contractor: **International Marine Constructors, C. A.**, Port Lavaca, Tex.
Completion: Summer 1959.

• **Iranian Oil Participants, Ltd.**
Project: 30 miles of 20-in. and 22 miles of 16-in. looping of Agha Jari to Bandar Mashur line.
Status: Planned.
Project: 50 miles of 26, 28-in. from Gach Saran field to new terminal at Kharg Island in the Persian Gulf.
Status: Under way.
Contractor: A joint venture of **Raymond Concrete Pile Co.** and **Williams Bros. Co.**, Tulsa, **Richard Costain, Ltd.**, and **John Brown, Ltd.**, London, and **Werkspoor & Brodoro**, The Netherlands.

• **Iraq Petroleum Co.**, London.
Project: 27 miles of 30-in. loop near T.2 station and 42 miles of 30 and 32-in. loop east of T.3.
Status: Under way.
Completion: 1959.
Project: 40 miles of 24-in. between Homs and Banias, Syria.
Status: Nearing completion.
Project: 31 miles of 30-in. loop east of T.2 station and 25 miles of 30-in. between T.3 and T.4 stations.
Status: Planned.
Completion: Last half 1959.

• **Israel Government**
Project: 16-in. loop of 8-in. line on 235-mile Gulf of Aqaba-Haifa system.
Status: Proposed.
Project: Replace 125 miles of 8-in. from Elath to Beersheba with 16-in.
Status: Under way.
Completion: Mid-1960.

• **Mene Grande Oil Co.**, Caracas, Venezuela.
Project: 24 miles of 16-in. from Zarza to Zulus; 12 miles of 24-in. from West Guara to Oficina; 5 miles of 24-in. near Melones.
Status: Planned.
Completion: 1959.

• **Middle East Pipeline.**
Project: 1,500 miles of 38, 40-in. from Persian Gulf to Mediterranean at Iskenderun, Turkey.

• **Oil India Private, Ltd.**, Digboi, Assam, India.
Project: 30 miles of 12-in.; 230 miles of 16-in. and 460 miles of 14-in. from Nahorkatiya, Assam, to Barauni, Bihar.
Status: Planned.
Completion: April 1962.

• **Pan American International Oil Co.**, New York.
Project: 84-mile 12 to 14-in. line from Comodoro Rivadavia field to Argentina's Atlantic Coast.
Status: Under way.

• **Petroleo Brasileiro S. A. (Brazil).**
Project: 40 miles of 12-in. from Catu to Madre de Deus in Bahia.
Status: Under way.
Contractor: **Techint, Inc.**
Project: 80 miles of 24-in. to tie in to proposed Caxias refinery near Rio de Janeiro.
Status: Planned.

• **Rotterdam-Rhine Pipeline Co.** (Caltex Petroleum Maatschappij, Bataafsche Petroleum Maatschappij, Gelsenberg Benzin A. G., and Moiloil A. G.)
Project: 59 miles of 30-in. and 96 miles of 24-in. from Rotterdam to Ruhr industrial area in West Germany to supply refineries at Godorf and Wesseling, and a 25-mile branch to Wessel to serve the refinery in Gelsenkuchen.
Status: Under way.
Contractor: **Bechtel International Co.**, is project manager. **Associated Pipe Line Contractors** has most of construction. German and Dutch firms have 33 miles of 24-in. in south Holland and four major submarine crossings.
Completion: Mid-1960.

• **Royal Dutch-Shell.**
Project: 700-mile line across Europe from the Mediterranean to the North Sea, running through eastern France, Luxembourg, West Germany, Netherlands, and Belgium. Main line to be 30-in.
Status: Considering project as joint venture with several other companies.
Project: 161 miles 20-in. line from Tandzung field to Balikpapan refinery, Borneo.
Status: Planned.
Contractor: **Williams Brothers Overseas, Ltd.**, Tulsa, and **John Brown, Ltd.**, London.
Completion: January 1, 1962.

• **SOPEG** (construction organization for Cie. Francaise des Petrole (Algerie) and Ste. Nationale de Recherche et d'Exploitation des Petroles en Algerie).
Project: 412 miles of 24-in. from Hassi Messaoud field in the Algerian Desert to Bougie on the Mediterranean Coast.
Status: Under way.
Contractor: **Entrepose Co.** and **Ste. Parisienne pour Industrie Electrique** have 281 miles. **SOCOMAN** and **Eau Assainissement** have 131 miles.
Completion: Late 1959.

• **South European Pipeline Co.** (Jersey

PIPELINE CONSTRUCTION

Standard, Caltex, and 17 European firms).

Project: 419 mile 30-in. line from Lavera, near Marseille, to Strasbourg, with 40-mile extension to Karlsruhe, Germany.

Status: Awaiting official approval of French Government.

Completion: 1962.

• **Superior Oil Co., Los Angeles.**

Project: A 16 and 24-in. line from its Lake Maracaibo, Venezuela, production to shore.

Status: Planned.

Contractor: **Pipe Line Technologists, C.A.,** Maracaibo, has design.

• **Syrian Pipeline,** Damascus.

Project: 500-mile line from Karshuk field, Syria, to Mediterranean.

Status: Proposed.

• **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimaza fields in Bashkiria to Irkutsk near Lake Baikal.

Status: Under way.

Project: 600-mile line from Russian fields to Czechoslovakia.

Status: Planned for 1960.

Project: Line from Russian fields to East Germany, possibly as part of a petrochemical expansion program.

Status: Planned.

Project: 2,500-mile, 100,000-bbl. crude line from the Volga-Ural oil fields to the Soviet satellites in eastern Europe.

Status: Planned.

Completion: 1965.

• **Venezuelan Sun Oil Co.**

Project: 18-in. crude line from Block 1, Lake Maracaibo, to Punta Palmas terminal.

Status: Under way.

Contractor: **J. Ray McDermott & Co.**

Completion: Summer 1959.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 815 miles of 12-in. from Campo Duran to San Lorenzo.

Status: Under way.

Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.).

Contractor: **Techint, Inc.,** has subcontract for 600 miles of 12-in.

Status: Under way.

Completion: Mid-1960.

Project: 390 miles of 14-in. from fields in Neuquen Province, Argentina, to Bahia Blanca on the coast.

Status: Bids requested.

Project: 625 miles of 12-in. from Mendoza to San Lorenzo.

Status: Planned.

Foreign Products Pipelines

• **National Iranian Oil Co.,** Teheran.

Project: 510 miles of 8-in. eastward from Teheran to Meshed, Iran.

Status: Planned.

• **North Atlantic Treaty Organization** (Bid details from Bureau of Foreign Commerce, U. S. Department of Commerce, Washington).

Project: 57 miles of 8-in. in Germany to Land Baden-Wuerttemberg air field.

Status: Planned.

Project: 93 miles of 6-in. in Turkey.

Status: Bids requested in June 1959.

• **Petroleos Mexicanos**

Project: Line from Mexico City to Toluca.

Status: Planned.

Project: Line from Mexico City to Cuernavaca.

Status: Planned.

Project: Line from Monterrey to Torreon.

Status: Planned.

• **Pipelines of Puerto Rico, San Juan.**

Project: 95 mile 8-in. line from Commonwealth Oil refinery at Penuelas to Catano in the vicinity of San Juan.

Status: Approved by Puerto Rican Public Service Commission.

• **Union of Soviet Socialist Republic.**

Project: 2,315 miles of 28-in. Trans-Siberian crude-products line from Ufa Tuimazi fields in Bashkiria to Irkutsk near Lake Baikal.

Status: Under way.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 652 miles of 10-in. from Lujan de Cuyo to Buenos Aires.

Status: Planned.

Foreign Natural Gas Pipelines

• **Attock Oil Co., Ltd.,** London.

Project: 60 miles of line from Dhulian field to Rawalpindi in West Pakistan.

Status: Planned.

• **Creole Petroleum Corp.,** Caracas.

Project: 17 miles of 30-in., 1.8 miles of 24-in., 1.7 miles of 20-in., and 1.6 miles of 16-in. from Lake Maracaibo flow stations to Conservation plant Bachaquero 1; 22 miles of 12-in. from Bachaquero 1 to Conservation plant Tia Juana 2.

Status: Planned.

Completion: June 1, 1960.

• **Cuban Gas Transmission Co.**

Project: 500-mile line from Campeche area of Mexico across Yucatan and a 150-mile line on the ocean floor to Havana.

Status: Under study by **Ebasco Services.**

• **French Government,** Paris.

Project: 400-mile big-inch gas line from Hassi R'Mel field to power plant at Bone, Algeria.

Status: Proposed.

• **Gaz de France.**

Project: 550 miles of 16 to 24-in. from Lacq field in southwestern France to Paris.

Status: Under way.

Contractor: French contractors.

Completion, 1960.

• **Indonesian Government.**

Project: 60-mile line from Radja field to proposed ammonia plant near Palembang, Sumatra.

Status: Planned.

Completion: Ammonia plant is scheduled for completion in 1962.

• **Kuwait Oil Co., Ltd.,** London.

Project: 10 miles of 12, 20, and 24-in. line in Burgan field.

Status: Under way.

Completion: Fourth quarter 1959.

• **Mene Grande Oil Co., Caracas, Venezuela.**

Project: 20 miles of 12-in. from Soto to Mata.

Status: Planned.

Completion: 1959.

• **Petroleos Mexicanos,** Mexico D. F.

Project: 130 miles of 22-in. to parallel a 14-in. line from Reynosa to Monterrey.

Project: 490 miles of 24-in. from Jose Colomo field in the State of Tabasco to Mexico City.

Status: Preliminary work under way.

Completion: March 1960.

Project: Line from Pemex City to Irapuato.

Status: Planned.

Completion: 1960.

Project: Line from Monterrey to Torreon.

Status: Planned.

Completion: 1960.

• **Standard-Vacuum Oil Co.,** New York.

Project: 60 miles of 8-in. in Sumatra terminating at Palembang.

Status: Planned.

• **Sui Gas Transmission Co.,** Multan, Punjab, India.

Project: 130-mile extension of the new 310-mile, 16-in. Multan-to-Sui, Pakistan line. Extension will terminate at Lyallpur.

Status: Planned.

• **Union of Soviet Socialist Republic.**

Project: A 465-mile line from Karadag near Baku to Tbilisi and Erevan.

Status: Under way.

Completion: 1960.

Project: A 127-mile line across the Turkmenian Desert from Kizyl-Kum to the Caspian Sea port of Krasnovodsk.

Status: Under way.

Project: Two parallel lines, each over 1,200 miles long, from Gazly, near Bukhara, northward to Sverdlovsk and Chelyabinsk.

Status: Proposed.

Project: Line from near Bukhara, through Tashkent to Chimkent, Dzhambul, Frunze, and Alma-Ata near the border.

Status: Proposed.

Project: Line from Sverdlovsk to Omsk, Kemerovo and Tomsk.

Status: Proposed.

Project: Line from Berezovo field to Sverdlovsk.

Status: Proposed.

Project: Line from Stalingrad to Gorky and to Moscow.

Status: Proposed.

Project: Line from Dzhebol field to Izhevsk and to Sverdlovsk.

Status: Proposed.

Project: Line from Gorky to Kazan.

Status: Under way.

Project: Line from Saratov to Sverdlovsk, with branches into Stepanovskoe field.

Status: Proposed.

Project: Line from Kanevskoe (Kransnodar) field to Sulkhumi.

Status: Proposed.

Project: Line from Shebelinka field to Rostov, to Odessa, and northward to connect with proposed line from Lvov to Leningrad.

Status: Proposed.

Project: Line from Riga to proposed line from Lvov to Leningrad.

Status: Proposed.

Project: Line from Rostov to Moscow.

Status: Proposed.

Project: Line from Severo-Stavropolskoe (North Stavopol) field to Moscow.

Status: Under way.

Project: Line from Leningrad to Moscow.

Status: Under way.

• **Yacimientos Petroliferos Fiscales (Argentina),** Buenos Aires.

Project: 1,015 miles of 24-in. from Camp Duran to Buenos Aires.

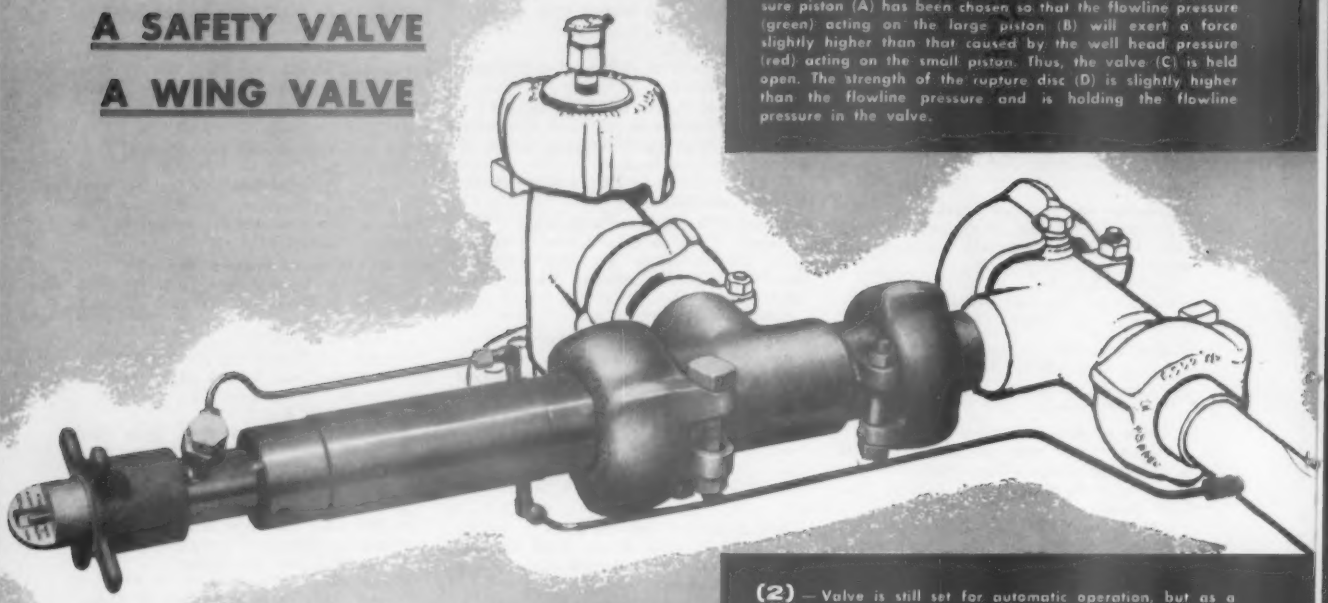
Status: Under way.

Contractor: **SARGO** (Fish Engineering Corp., Fish Northwest Constructors, Inc., Clark Brothers, North American Utility, Construction International Co.), subcontracted to COGAR (River Construction Corp., Ft. Worth, Tex.), Milton Brazier, supt. for 700 miles from Buenos Aires to Tucuman, office at Buenos Aires; E. L. "Tex" Maggard, supt. for 400 miles from Campo Duran to Tucuman.

Completion: August 1960.

Project: Line from Comodoro Rivadavia to Buenos Aires with a spur to Plaza Huincul field in Neuquen province. Line will be 26-in. to the connecting point for the Plaza Huincul link and 30-in. from the connection to Buenos Aires.

A SAFETY VALVE
A WING VALVE



UNIBOLT *Pressurematic*
Balanced Piston VALVE

It is entirely pressure operated—*no springs.*

It automatically protects flowlines, separators, treaters and other equipment against high well pressures.

It automatically shuts in the well in case of a broken flowline or failure of any equipment in the gathering or treating system.

It serves the *dual* purpose of a Christmas tree wing valve and an automatic safety valve. As a wing valve, a few turns of the hand-wheel opens and closes it. Or, set the hand-wheel in automatic position and it's a high-low safety valve.

It uses the time-tested fundamental engineering principle of balancing a large piston which is exposed to low pressure (flowline) against a small piston which is exposed to high pressure (well head). Any fluctuation in these pressures will disturb the balanced pistons and cause the valve to close.

The automatic assembly is stainless steel throughout and may be readily adapted to any UNIBOLT 2" Wing Valve or Choke Body.

It is economical, and saves the cost of one valve.

Completely descriptive literature gladly sent on request.

THORNHILL UNIBOLT THE ONE BOLT COUPLING **CRAVER CO.**

P. O. Box 1184 Houston, Texas

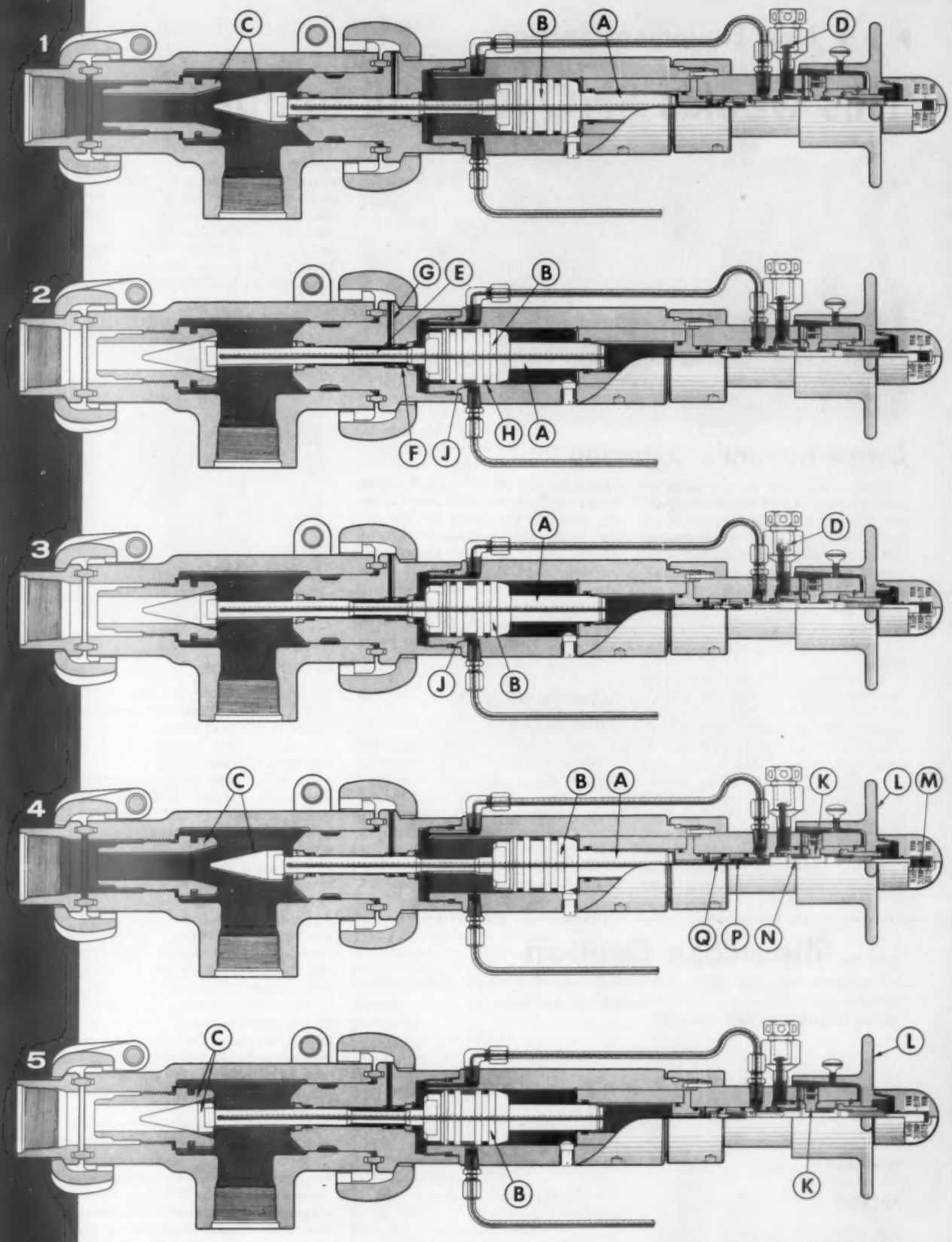
(1) — Valve is set for automatic operation and is in the open or flowing position. The size of the small or high pressure piston (A) has been chosen so that the flowline pressure (green) acting on the large piston (B) will exert a force slightly higher than that caused by the well head pressure (red) acting on the small piston. Thus, the valve (C) is held open. The strength of the rupture disc (D) is slightly higher than the flowline pressure and is holding the flowline pressure in the valve.

(2) — Valve is still set for automatic operation, but as a result of a reduction in flowline pressure (green), the valve has closed. This would result from, for example, a line break. The reduction of flowline pressure has lessened the force exerted on the large piston (B) until it has been over-balanced by the force of the well head pressure (red) on the small piston (A), thus closing the valve. As the piston moves toward the closed position, note that the reduced diameter portion (E) of the stem moves past an "O" ring seal (F). As a result the space under the large piston (B) which contained flowline pressure is now bled to atmosphere (blue) through port (G). This assures the valve closing fully as it prevents pressure being trapped under the piston. Note, also, that the first large "O" ring seal (H) on the large piston (B) has moved down past the inlet (J) of the flowline pressure, thus shutting off the source of flowline pressure to the valve. This action prevents the reopening of the valve in the event the flowline pressure should build up again. This is a safety feature, making it necessary for the operator to go to the valve to reset it after it has operated.

(3) — Valve is still set for automatic operation but in this case it is closed due to a build-up of flowline pressure above that pressure for which the rupture disc (D) was selected. The rupture disc has burst due to overpressure and this has bled to atmosphere the area under the large piston (B). The high pressure acting on the small piston (A) then closed the valve in the same manner as in (2). Note that once again the flowline pressure inlet (J) is closed off by the large piston (B) so that the rupture disc (D) ceases to bleed-off pressure as soon as the valve closes.

(4) — Valve is shown being opened manually with the pilot valve which is built into the top of the main valve. Before this is done the operator must take steps to correct the conditions which caused the closing. For example, if the rupture disc has burst, it must be replaced. In this step the pilot valve has been placed in the manual open position by rotating the handwheel (L) counterclockwise until it hits the stop (K). The indicator (M) at the top indicates the position of the main valve (C) as controlled by the pilot valve. The pilot valve stem has moved down to unseat the small "O" ring seal (P) at its lower end and the small check valve (Q) has been opened by the end of the pilot valve stem (N). This allows the well head pressure to be channeled back to the underside of the large piston (B) which overpowers the force of this same pressure on the smaller piston (A), thus moving the pistons to the open position.

(5) — In this view the pilot valve is set for manual closing of the valve (C). This is accomplished by rotating the handwheel (L) clockwise until it hits the stop (K). This relieves the pressure under the large piston (B) and the valve closes in the same manner as if the rupture disc had burst. In this position there is no flow of gas after the valve closes and the valve may be left in the manual close setting position for as long as desired without ill effects.



U.S. Patents — 2684688, 2684689, and others pending

This week's SHOWCASE features . . .

Latest hydraulic pumping unit

. . . just announced is a pneumatic counterbalanced type that holds promise of reducing lifting costs where rod pumping can be used. An unusual system of pneumatic counterbalancing is used to reduce horsepower requirements. This design feature is combined with a long stroke to make the unit suited for economically pumping deep wells with limited productivity.

A hydraulic cylinder reciprocates the rod string. It mounts directly on the wellhead. The remaining parts—motor, hydraulic pump, oil reservoir, and pneumatic counterbalance—mount on a skid located near the wellhead. No permanent foundation is needed. The unit is portable and easy to move to new locations. It can be installed, serviced, and started within a short time after the last rod is run. Installation time runs about an hour. The unit does away with the need for a gear box or counterweights. Speed can be from one to eight strokes per minute. Two sizes of the unit are made with polish-rod loads of 12,000 and 22,000 lb. Larger units are also available on special order. The 22,000-lb. unit sells for about $6,200. **Contact Manufacturer: Precision Pump Co., P. O. Box 3248, Tulsa, for details on Precision pump.**

●

Submersible pump stays efficient

. . . over a wide operating range. This latest pump design has the motor on the bottom end of the shaft submerged into a well, rather than above the surface as with vertical turbine pumps. Called an ultrahigh flow (UHF) design, the pump is engineered so you can select a custom-made pump from a standard group of alternates.

The pump is designed primarily for use with deep settings and high heads. It is also appropriate where a minimum space is available or where noise from surface units would be objectionable. **Contact Manufacturer: Worthington Corp., Harrison, N. J., for details on UHF submersible pump.**

●

Valves open easy with new tool

. . . recently placed on the market. Called a Roto Hammer, it offers a faster, easier, and more effective mechanical method for the initial unseating and final seating action of a valve in any heat or pressure service. The unit's hammer and anvil components transfer an impact to the elevating mechanism which actuates the valve.

The unit is made in hand and chain-operated models. Whether the impact is hand or chain delivered, only finger-tip effort is required on any size valve. The device is bolted or clamped to the existing valve handwheel, or the handwheel may be replaced with an adapter if desired.

Noteworthy features include one-man operation at ground level, eliminating the need for platforms; positive valve shutoff, eliminating the possibility of mixing products at manifolds; and immediate valve control in an emergency.

The tool is made in four stock sizes to handle any valve in sizes from 2 through 16 in. Special sizes for larger are also available. Prices range from about $32 to $73 f.o.b. factory. **Contact Manufacturer: Roto Hammer Co., 2804 West Fortieth Street, Tulsa 7, for details on Roto Hammer.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

Described in OIL AND GAS JOURNAL - Issue of August 31, 1959

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

Pressure switches stand rugged use

. . . and come in two versions. One is a liquid-level control that you can use to start a pump motor or other electrical device when liquid level in a tank hits any preset level up to 25 ft. It will stop the pump when the tank liquid lowers to any preset level. Level settings can be changed by turning the adjusting screw.

An advantage of this switch is that it can be used to take the place of two float switches. Too, it can be installed on a line connected to the tank either at the tank, or any distance away.

The other switch is designed to automatically shut down a pumping well when line pressure exceeds a set limit. It can be used with automatic custody transfer where an emergency signal from a full surge tank will shut a valve at the separator inlet, building up pressure on the flow lines from the wells to actuate the shutdown switch at each well. **Contact: Manufacturer: Major Engineering Co., 1214 South Norwood, Tulsa, for details on pressure switches.**

●

Automatic circular-chart changer

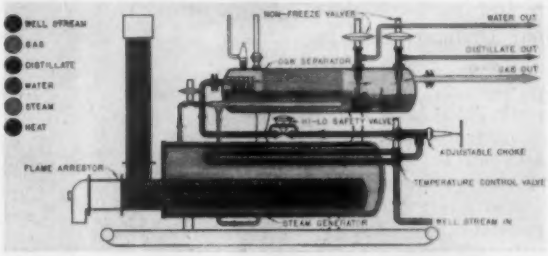
. . . has just been put on the market. The Automatic Meterman affords the use of as many as 40 circular charts in a single recorder. It works like this: At virtually any desired time, date, or frequency, it disengages the charts, one by one, and drops them by gravity into a self-contained storage box.

It requires only a minute portion of available clock power. Any number of field or plant recorders can be serviced without manual attention, at the same time. This makes it possible to correlate the charts with master-meter charts without multiple computations. The device is designed for use on all conventional recorders using circular charts of any diameter or thickness. **Contact Manufacturer: Maeder-Squier Co., Box 5145, Dallas, for details on Automatic Meterman.**

Tank repair is easy with epoxy resin

. . . adhesive recently made available in commercial quantities. In the field or plant, field tests show the product, Conley Weld C1-C2, can prove valuable as a cold weld for repairing tanks where conventional welding equipment cannot be used safely, the maker reports. It can also be used as a pipe sealant, for repair of equipment, and for bonding metal, wood, glass, ceramic, masonry, rubber, porcelain, glass fiber, and other plastics.

Application is easy. It only requires a simple and visual measuring and mixing of the two components in equal proportions and application to sanded or buffed bonded areas. The product contains no metal, is nontoxic, nonexplosive, and resistant to dilute acids and alkalies, according to the maker. **Contact Manufacturer: Ed Conley Plastics Corp., Ninety-first and Delaware, Tulsa 5, for details on Conley Weld C1-C2.**



Three-phase separation system

. . . for production recently made available is a prepiped, skid-mounted unit equipped with a steam generator especially designed to produce wells that require preheat before choking down to separator pressure. Called Production Pak, the unit is equipped with automatic controls and valves to maintain control over water-bath temperatures and sales gas leaving the separator.

According to the maker, use of the steam generator to heat the separator base and well stream instead of the conventional water-bath-heater method permits a higher mean temperature difference and less area requirement, and it makes a convenient and dependable means of moving heat to the base of the separator.

The separator and generator are code stamped. To prevent flashback, the unit is equipped with a flame arrestor. It is available with capacities of 2½ to 6 million cubic feet of gas a day. Larger capacity units are also available. **Contact Manufacturer: National Tank Co., Drawer 1710, Tulsa, for details on Production Pak.**

●

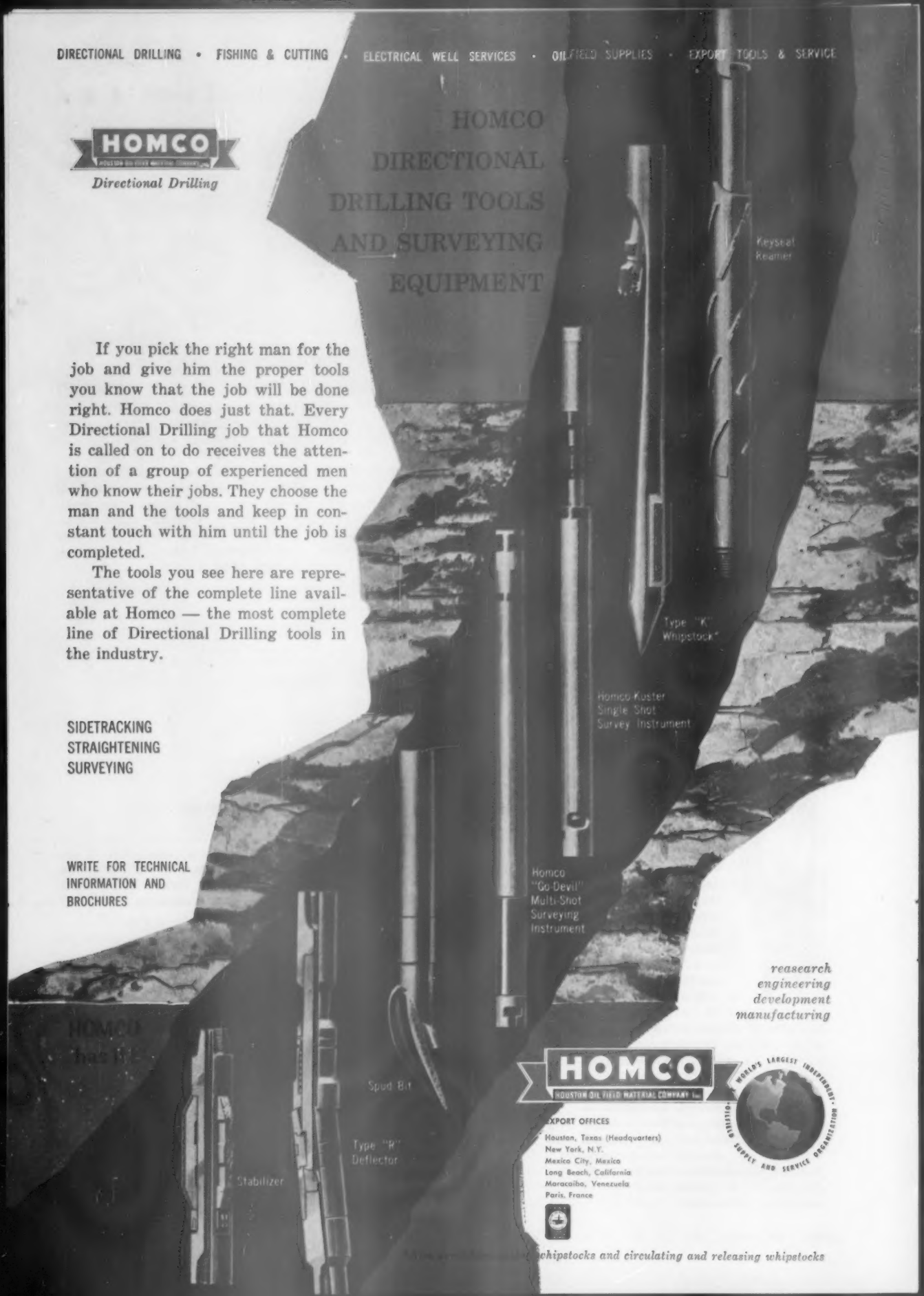
Improved tubing is easier to run

. . . in multiple-completion wells. This Grayloc tubing is now being made with a ⅛-in. bearing face and a 15° bevel. The big advantage of the design change is that it eliminates hangup of tubing strings going into or coming out of a well. With the beveled box end, the tubing and

DIRECTIONAL DRILLING • FISHING & CUTTING • ELECTRICAL WELL SERVICES • OIL FIELD SUPPLIES • EXPORT TOOLS & SERVICE

HOMCO

Directional Drilling



If you pick the right man for the job and give him the proper tools you know that the job will be done right. Homco does just that. Every Directional Drilling job that Homco is called on to do receives the attention of a group of experienced men who know their jobs. They choose the man and the tools and keep in constant touch with him until the job is completed.

The tools you see here are representative of the complete line available at Homco — the most complete line of Directional Drilling tools in the industry.

SIDETRACKING
STRAIGHTENING
SURVEYING

WRITE FOR TECHNICAL INFORMATION AND BROCHURES

reasearch
engineering
development
manufacturing

HOMCO

HOUSTON OIL FIELD MATERIAL COMPANY Inc.

WORLD'S LARGEST INDEPENDENT OILFIELD SUPPLY AND SERVICE ORGANIZATION

EXPORT OFFICES
Houston, Texas (Headquarters)
New York, N.Y.
Mexico City, Mexico
Long Beach, California
Maracaibo, Venezuela
Paris, France

whipstocks and circulating and releasing whipstocks

an adjacent string of API threaded and coupled tubing can slide past each other freely.

The tubing can be had in three sizes and grades—2⅜, 2⅞, and 3½ in. o.d. and Grades J-55, N-80, and P-105. One particular advantage of the Grayloc joint is the sealing ring with flexible lips that deflect within their elastic limit as the joint is made up to form a surface seal against mating seats in the tubing. Fluid pressure in the tubing increases the effectiveness of the seal. **Contact Manufacturer: Jones & Laughlin Steel Corp., Three Gateway Center, Pittsburgh 30, for details on Grayloc tubing.**

●

Regulator to take severe service

. . . as found at wellheads and in gas gathering and transmission has just been made known. It is a semibalanced, single-seat angle type. Maximum inlet pressure is 3,000 psi. Operating temperatures can range from −60° to 180° F.

The Type 299 regulator can handle gas having a high solids content with minimum effect from erosion, the maker says. The valve and body are designed so high-velocity expanding gas is directed in a straight line out the discharge without impinging on the valve or body structure. All castings are made from ductile iron. Trim is corrosion-resistant. Valve and seat have Stellite inserts. Available sizes are 2 and 3 in. Five interchangeable orifices are available. **Contact Manufacturer: American Meter Co., 920 Payne Avenue, Erie 6, Pa., for details on Type 299 regulator.**

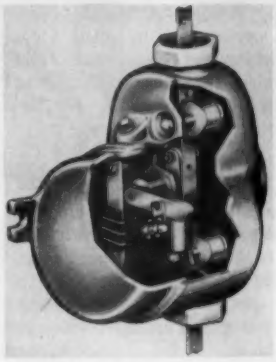
●

Level control is easy to install

. . . by untrained personnel. This new control has no adjustments that must be made in the field. The control relay is hermetically sealed and plugs into a chassis which is also a plug-in type.

The only tool needed for maintenance is a screw driver, the maker says. The control, called Prob-A-Larm, is suited for material having a high dielectric constant such as water or acids. Applications include water drawoff and hydrocarbon tanks. A special shield is used to prevent contamination from becoming a problem. **Contact Manufacturer: Jarco Services, Inc., 415 South Kenosha, Tulsa, for details on Prob-A-Larm.**

●

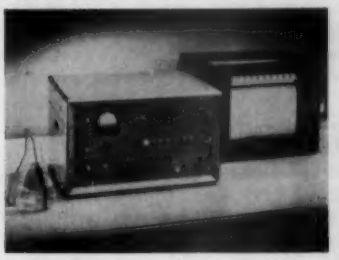


Control for automatic tank gages

. . . now obtainable enables either an operator of a remote gaging system or a gager, reading an automatic tank gage, to immediately detect a broken tape or any abnormal slackening of the tape at the time of reading and thus reject the reading at the receiver or ignore it at the gage head.

Construction is simple. A mercury switch is held in position by an arm attached to an idler pulley that rides against the gage tape. If tape breaks or becomes abnormally slack, the switch tilts to an open or closed position. Visual or audible alarms or other signaling devices can be used. The Slack Take alarm control can be installed in the field to existing pulse-code telemetering systems easily. Price is $140 f.o.b. factory. **Contact Manufacturer: Vapor Recovery Systems Co., Box 231, Compton, Calif., for details on Slack Take alarm control.**

●



Corrosion measuring made automatic

. . . with this recent development in instruments, the Model L-2 Corrosometer. The servocontrolled instrument is capable of detecting as little as 1,000,000th-in. of corrosion on a routine basis. It detects corrosion as it occurs and gives a permanent record of the total thickness of metal corroded. The record is presented as a function of time which can be quickly converted to the rate of attack.

In the laboratory, the instrument offers a way to simplify the job of evaluating the effects of corrosion inhibitors on the resistance of various metals to known corrosive conditions. One of the meters can be used to monitor up to 12 individual tests by using additional measuring units.

The instrument is expected to prove valuable in refineries and petrochemical plants to detect change in corrosion rate. **Contact Manufacturer: Crest Instrument Co., 11808 South Bloomfield Avenue, Santa Fe Springs, Calif., for details on L-2 Corrosometer.**

Send this **Showcase Coupon**

to the Manufacturer of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

Described in OIL AND GAS JOURNAL - Issue of August 31, 1959

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

SHOWCASE . . .

New Literature

74-page caustic-potash booklet

. . . which presents properties and handling of the potassium-hydroxide grades, is now available gratis upon request. Considerable detail is given to the physical and chemical properties of caustic potash and its water solutions.

Tables and graphs detail solubility, densities, Baume hydrometer readings, specific gravity, and heat of solutions. A section of the booklet is devoted to general information and conversion tables.

A complete wall chart on "precautions in handling caustic potash," is printed on a foldout page in the back of the publication. **Contact Manufacturer: Advertising & Sales-Promotion Section, Solvay Process Div., Allied Chemical Corp., 61 Broadway, New York City 6, for Caustic-Potash booklet.**

108-page catalog gives 11 products

. . . especially designed for the petroleum industry. Descriptions and specifications are listed for oil field, petroleum, air, water, steam, and fire hose; V-belts and poly-V drives; mechanical packings and gasket material; and oil-field brake blocks.

Catalog M1300 also introduces a new moistureproof package which assures that matched V-belts kept in stock will stay matched, won't age unduly, or "relax" in inventory. **Contact Manufacturer: Manhattan Rubber Div., Raybestos-Manhattan, Inc., Passaic, N. J., for Catalog M1300.**

How is a battery charged

. . . or discharged? This question and many others are answered in a new lead-acid battery publication, which contains 40 pages of technical instructions and engineering data on the care of motive-power storage batteries.

Available upon request, the literature covers all phases of battery theory, operation, and maintenance. Booklet GB-1896 outlines the theory of lead-acid batteries, and gives basic information on specific-gravity changes, charging and discharging, positive and negative-plate composition, and other operating principles.

A maintenance section offers instructions for general repairs like replacing jars, covers, and separators; and installing, repairing, and charging of plugs and receptacles.

A table gives the ratios of parts-of-water to parts-of-acid required to obtain given specific gravities, when preparing electrolyte necessary for repairs. **Contact Manufacturer: Gould-National Batteries, Inc., Stone and Calhoun Streets, Trenton 7, N. J., for Booklet GB-1896.**

Expansion-joint literature

. . . offers 6 pages of information on nomenclature and selection of joints. The folder contains general information on flanges, liners, covers, and temperature ratings. A list of company representatives is included. **Contact Manufacturer: Expansion Joint Div., Badger Mfg. Co., 230 Bent Street, Cambridge 41, Mass., for Expansion Joint Folder.**

Fluid-processes buyers guide

. . . explains fluidics—the science of fluid processes—as a new program providing a modern, imaginative approach, plus specialized materials and equipment for more profitably handling and processing industrial liquids and gases.

Applications in the 16-page literature range from reactions to storage, from water treatment to waste treatment, from design and development to project engineering.

Specific areas covered in Bulletin 980 are corrosion engineering, water treatment, ion exchange, reactions, distillation and evaporation, drying and blending, centrifuging, heat transfer, filling, storage, agitation, valving and piping, gas analysis and control, flow-rate metering and control, waste treatment, and project engineering.

Each section is illustrated with photos and engineering data. **Contact Manufacturer: Pfaudler Div., Pfaudler Permutit, Inc., 1094 West Avenue, Rochester, N.Y., for Bulletin 980.**

Two-color corporate brochure

. . . now available from Houdry Process Corp., depicts the firm's contributions to progress in petroleum, petrochemical, and chemical industries, and details processes, products, and services.

In addition, engineering, research and development, and manufacturing capabilities are discussed in the eight-page publication. Processes are listed for catalytic cracking, catalytic reforming, and dehydrogenation for olefin and diolefin production.

Products include catalysts such as synthetic silica alumina, mineral kaolin, alumina, platinum, nickel, cobalt molybdate, and chromic oxide, as well as Dabco, for making urethane foam. **Contact Manufacturer: Houdry Process Corp., 1528 Walnut Street, Philadelphia 2, for corporate brochure.**

Durolite blocks and sheaves

. . . are detailed in new Catalog 1, which contains tonnage capacities and recommended wire-rope sizes. The 10-page literature gives complete information on the Durolite blocks in sizes from 6 to 18 in. with bronze bearings; and from 8 to 42 in. with roller bearings. Photographs, features, selection tables, and recommended sizes are included. **Contact Manufacturer: Sauerman Bros., Inc., Dept. O-3, 620 South Twenty-eighth Avenue, Bellwood, Ill., for Catalog 1.**

Propeller and mixed-flow pumps

. . . are described in new six-page Folder 350 now available. Applications include flood control, condenser cooling, construction dewatering, and drainage, river, transfer, sump, and ditch pumping. The literature contains cutaway drawings, installation sketches and measurements, and performance tables. **Contact Manufacturer: Layne & Bowler, Inc., P.O. Box 6697, Hollywood Station, Memphis 8, for Folder 350.**

Plant waste-disposal system

. . . called Somat, is outlined in a 12-page brochure, free for the asking. The publication shows how the machine takes in refuse, chews it instantly into finely ground, compacted pulp far less bulky than original waste, renders it odorless without the use of chemicals, and discharges it to haul-away containers for fast, easy disposal.

The brochure lists a wide variety of uses for Somat, and discusses types of grindable waste and refuse that the machine will handle. A step-by-step photo-diagram shows every stage of the operation.

Case histories and installation photos are included, along with a thumbnail history of the unit's development. **Contact Manufacturer: Wandel Machine Co., Pomeroy, Pa., for Somat brochure.**

Control-valves Bulletin 150

. . . lists valve bodies, actuators, and accessories. The new 20-page publication also contains valve sizing data. It diagrams a new principle known as the DeZurik eccentric, and lists primary advantages of the valves. **Contact Manufacturer: DeZurik Corp., Dept. CV, Sartell, Minn., for Bulletin 150.**

Lathrop named district engineer

. . . at New Orleans for machinery and equipment sales and service for U. S. Steel Corp.'s Oil Well Supply Division. After joining the division 3-years ago at Harvey, La., Charles T. Lathrop was appointed assistant district engineer, machinery and equipment sales and service. He was transferred to New Orleans last year, retaining the same position.

John Prejean is appointed

John Prejean

. . . regional manager for Otis Pressure Control, Inc., in Canada, replacing J. G. Spalding, who resigned. Prejean was formerly division manager for Otis Engineering Corp., parent company of the Canadian organization, in the firm's Houma, La. branch.

He joined the firm in 1953, and also was attached to Otis' New Iberia, La., and Corpus Christi and Falfurrias, Tex. offices. Prejean will make his headquarters at the company's Calgary branch.

Maurice E. Holladay appointed

M. E. Holladay

. . . a vice president of Chiksan Co., Brea, Calif., and general manager of the firm's newly acquired Hamer Valves Division, announces H. J. Hagn, Chiksan president. Holladay had been vice president and co-manager, with L. S. Hamer, of Hamer Valves, Inc., Long Beach, Calif., prior to Chiksan's recent purchase of the Hamer firm.

Holladay joined the engineering department of Hamer in 1936 and became involved in the design and production of products now manufactured by Hamer Valves.

Hughes Tool Co. appoints

. . . A. K. Baebel manager of export sales for the Western Hemisphere, with headquarters in New York City,

A. K. Baebel

T. M. Short

and T. M. Short to manager of the Northern Division of South America, with headquarters in Maracaibo. The announcement comes from W. H. Siems, the company's general sales manager.

Baebel, who succeeds O. B. Latrobe, has been with Hughes since 1940, and has represented the company in various sales capacities in the Mid-Continent area prior to going to South America 11 years ago.

Short, who replaces Baebel as division manager, formerly was Northern Division engineer. A Hughes employe for the past 21 years, Short represented the company in sales and engineering capacities in the United States before going to South America.

Foxboro Co. announces

. . . the appointment of two new branch managers, a regional engineer, and two sales engineers.

R. F. Sutton has been named branch manager at Philadelphia; T. A. Jones, branch manager of the Atlanta office; F. H. Leathers, regional engineer for southwestern states; G. W. Howlett, sales engineer at Pensacola; and L. L. Hodges, sales engineer at Mobile.

NEW QUARTERS of Mid-States Chemical Co., are located in Mount Vernon, Ill. The building contains offices, product showroom, plus manufacturing and warehousing facilities. Mid-States manufactures chemicals for the petroleum industry and is national distributor for a number of manufacturers.

Bovaird Supply Co. expands

. . . territory and service with a new store at Natchez, Miss. W. J. Bovaird, sales manager, announced that Stanley J. Mead will be manager of the store. District office for the area is at Shreveport, under the supervision of Ralph T. Enloe, district manager.

Lucey Products Corp. names

. . . three new special representatives. A. Rex Watkinson, Jr. takes over as special sales representative with headquarters at Tulsa. Most recently president of Crescent Oil Well Supply Co., Watkinson has held supervisory and managerial posts with Broderick & Bascom Rope Co. and Dewey Supply Co.

R. A. (Bob) Pitzer will represent Lucey in the Gulf Coast area, and will headquarter in Houston. He is a partner in Syljo Gas Co., Houston. Frank J. Ackman, Jr. is the company's new representative in the Arkansas-Louisiana-Texas area, with headquarters at Shreveport. Ackman's supply-business career has included posts with Ideco, Jarecki, and Rochester Ropes, Inc.

Grant Oil Tool Co. announces

. . . the appointments of Don Etter to sales manager, and Leland Auer to chief engineer.

Don Etter

Leland Auer

Etter was manager and Auer was chief engineer of Cosasco Division of Perfect Circle Corp. prior to the Grant acquisition.

Auer succeeds Clarence Leathers, who has been promoted to executive engineer of Grant and its MacClatchie and Cosasco Divisions.

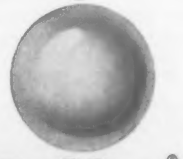
W. C. Walters is appointed

. . . liaison engineer and production coordinator for the manufacture of oil-well products of Pacific Pumps, Inc., reports E. A. Loth, vice president of the Dresser division.

For 5 years Walters was employed by Emsco Derrick & Equipment Co. as a designer and engineer. In 1950 he joined Axelson Mfg. Co., where he was concerned with the design,

Sour Oil, Lodestone, Pressure,
Sand Cutting, Hydrogen Sulfide,
Ball Pounding, Salt Water Brine,
Magnetism, High Temperature,
Impact...Nothing Affects

That's right... with DuMore Balls and Seats, none of these conditions will cause a valve failure. DuMore is corrosion-proof to any known well fluid, and its metallurgical properties are surpassed only by the hardness and wearing qualities of tungsten carbide—the hardest metal in commercial use. A bargain at any price, DuMore costs only a little more than regular grade ball valves. Moreover, the expense of one pulling job alone will more than pay for fitting out a pump with DuMore Balls and Seats. • Try DuMore the next time you run a pump. You'll be more than satisfied with the service you'll get, and you'll like saving those pulling jobs, too! Ask your supply store about DuMore.



HF

"Best Balls and Seats in the Oil Patch"

HARBISON-FISCHER · FORT WORTH

manufacture, and distribution of subsurface oil-well pumps and related equipment.

Five appointments are made

L. V. Carson

. . . by Schlumberger of Canada, a division of Schlumberger, Ltd., according to H. C. Gerdes, vice president.

L. G. Chappel has been transferred to Schlumberger Well Surveying Corp. as manager of the Oklahoma division. Chappel, an 11-year company employe, will locate at Oklahoma City. W. T. Wilson will replace Chappel as western division

L. G. Chappel

W. T. Wilson

manager at Edmonton. Wilson, who joined Schlumberger in 1950, most recently was senior sales engineer in Edmonton.

W. S. Jones, newly appointed assistant to the vice president, previously was area staff specialist based at Calgary headquarters. He started with the company in 1948. B. M. McVicar has been named general sales manager, and will head the newly formed department which will direct sales for the Canadian company. McVicar, who joined Schlumberger in 1949, most recently was Eastern Canada division manager at Regina.

W. S. Jones

B. M. McVicar

L. V. Carson takes over as Eastern Canada division manager at Calgary. Formerly a senior sales engineer at Calgary, he began with the firm 7 years ago.

Stan Fain becomes manager

. . . of advertising and sales promotion for R. G. LeTourneau, Inc., announces R. L. LeTourneau, vice president of the Longview, Tex. firm.

Stan Fain

Fain joined the company 3-years ago as advertising supervisor, later becoming assistant manager. For 9 years prior to starting with LeTourneau, he was assistant advertising manager for American Air Filter Co.

R. D. O'Brien is advanced

R. D. O'Brien

. . . to group executive for the two petroleum-equipment divisions of U. S. Industries, Inc., announces John I. Snyder, Jr., chairman of the board and president. Until recently, O'Brien was secretary of USI. He is now charged with the guidance of USI's Garrett Oil Tools and Axelson Divisions. O'Brien is succeeded as secretary by Edward L. Kanter, who has been USI's assistant secretary the past 2 years.

Rodney Freeman is appointed

. . . sales representative for Wheland Co., according to Gordon L. Smith, Jr., manager of rotary drilling-equipment sales. Freeman now is being trained at the company's Chattanooga plant. After training, he will work in Louisiana, Mississippi, Arkansas, and the Upper Texas Gulf Coast. He will locate in Lafayette, La.

Rodney Freeman

Freeman has had 10-years experience in drilling and servicing equipment sales. He formerly was district manager for Cardwell Mfg. Co. in Lafayette and Houston. Prior to that he was with Ideco, Inc., in Houston.

Sargent Engineering establishes

. . . a new Systems Division to manufacture, design, and install automated surface equipment for field treatment of crude oil, according to W. H. Sargent, the corporation's vice president. S. L. Stentz will head the new division. He has been associated with oilfield surface equipment design and installation for 24 years.

Yuba acquires Petro-Chem

. . . Development Co., Inc., of New York City, along with its American and Canadian subsidiaries. The announcement was made by John L. McGara, president of Yuba Consolidated Industries, Inc., San Francisco.

Petro-Chem will retain its present name and will operate as a Yuba subsidiary. Sales and engineering headquarters will remain in New York City. Petro-Chem's manufacturing facility in Houston—American Industrial Fabricators, Inc.—will operate as a Yuba division.

J. W. Cooper named manager

. . . of Failing Co.'s Canadian subsidiary, George E. Failing Supply Co., Ltd., of Edmonton. The announcement comes from E. A. Johndrow, vice president, sales, of the Enid, Okla. company.

J. W. Cooper

Jimmy Helton

Cooper has been with Failing's Canadian operations the past 14 years. Previously he was employed by Union Tractor Co. of Canada.

Jimmy Helton, who managed the Canadian subsidiary the past 4 years, has been made West Coast district manager with headquarters in Oakland. He previously was manager of Failing's branch store at Midland, Tex.

S. L. Easley is named manager

. . . of Jones & Laughlin Supply Division's store at Best, Tex., according to A. G. Bastian, manager of field operations. Easley joined J&L as storeman at Sundown, Tex. in 1948. He was transferred to Best in 1950, and was salesman there before his new appointment.

Virgil C. Gallman joins

. . . the sales department of Warner Lewis Co., division of Fram Corp., Tulsa. He will handle sales and service of Warner Lewis products in Oklahoma and southern Kansas. Gallman has over 20 years experience in production, refining, and pipelining.

Texas Instruments, Inc. to build

. . . and install a completely automated electronic supervisory-control system for an offshore gas-well production platform near Corpus Christi under a turnkey contract awarded by Gulf Oil Corp.

The heart of the unmanned offshore installation, with its onshore control center, is the TI-742 digital code transmission system, developed and produced in the Houston plant of Texas Instrument's GeoSciences & Instrumentation Division.

The system provides continuous chart records of individual well performances and other monitoring information. It isn't necessary to keep maintenance personnel on the offshore platform. All data telemetering, control, and alarm information sufficient to operate the lease remotely is transmitted between the land-based control site and offshore platform by way of a dual-wire submarine cable.

SALES CONFERENCE of Macco Oil Tool Co., Inc., was attended by company representatives and distributors from areas all over the United States and Mexico. At the two-day meeting held in Houston, the men received reports on Macco's current research activities, new wire line gas-lift equipment, motor valves, time-cycle controllers, and techniques recently developed for application of fluid-operated gas-lift valves in oil wells.

NOW—A REVOLUTIONARY APPLICATION OF HYDRAULIC POWER

WESTERN'S SANDRIL PROCESS

Versatile new method of—

- ★ Controlled penetration in casing perforating
- ★ Controlled penetration in open-hole perforating
- ★ Shoot and treat on same set-up
- ★ Shoot and test on same set-up
- ★ Assured penetration through contaminated zone
- ★ Permanent completion
- ★ Natural completion with no treatment
- ★ Any application requiring deep penetration into matrix

Sandril is the Western-developed process that utilizes hydraulic power and an abrasive sand-fluid mixture as a highly effective method for perforating casing, cement and/or formation with controlled penetration — measured in feet instead of inches.

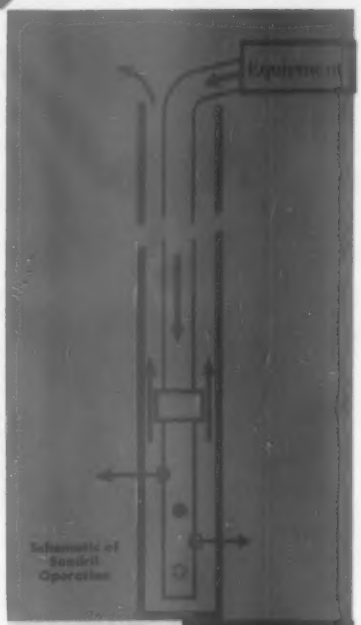
The Sandril tool is run into the hole on the end of the tubing string, then the fluid-sand mixture is pumped down the tubing, through orifices in the tool, and jetted against the casing and/or formation. Penetration is controlled by pumping time.

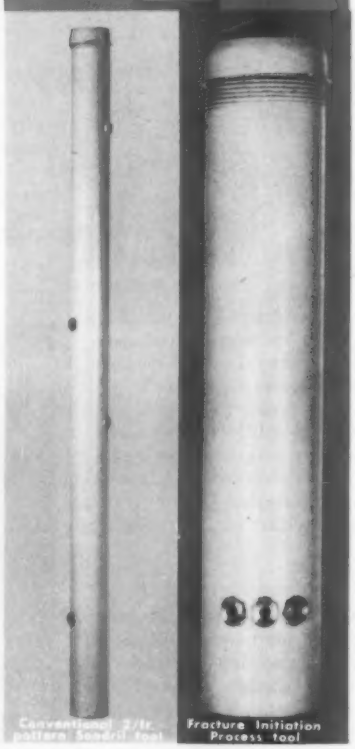
Treatment immediately following perforating may be accomplished down the annulus, or the annulus and tubing, since the tool is designed with a ball-and-seat valve in the bottom. To treat, the ball is circulated out after perforating.

With Sandril, there is no shattering of cement, no burring as with explosive-type perforating, and no projectile or carrot to obstruct the perforations.

Actual field applications show many instances where deep penetration with Sandril is the only effective answer to perforating problems, and many more where Sandril is much superior to any other method.

Put Sandril's controlled penetration to work in your well service program. Call your Western Engineer.





THE WESTERN COMPANY

WESTERN — Engineered

ENGINEERING LEADERSHIP 20 YEARS 1939-1959

WESTERN ENGINEERING MAKES THE DIFFERENCE!

General Offices: P. O. Box 186, Fort Worth, Texas

An explosion at this offshore rig illustrates an example of . . .

Oil-industry teamwork

OIL MEN sensed trouble before the crisis came at the recent explosion and ensuing fire on an offshore Louisiana rig. Crisis and disaster aren't imperative climates for oil industry cooperation. It goes on all the time.

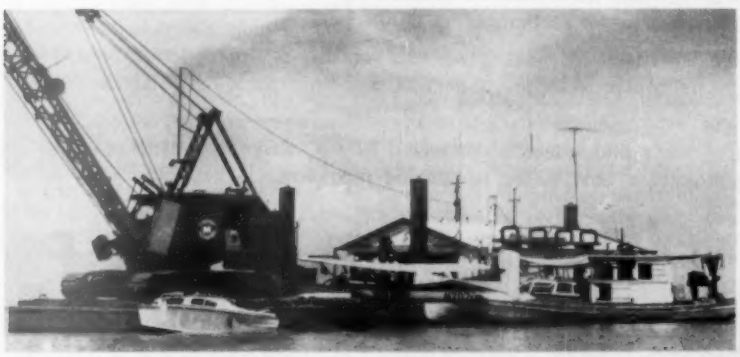
Oil men think more alike than most people will admit—even themselves. Their respective problems have a striking parallel. Look at the joint ventures in drilling and exploration. Units and unitization are commonplace occurrences — agreements are understood and used by most.

A few weeks ago the Gracey-Hellums Co. Barge 3 was drilling Well 23 on State Lease 2826 for Union Oil Co. of California and Louisiana Land & Exploration Co. Hole depth was approaching 8,500 ft. and the operation was routine.

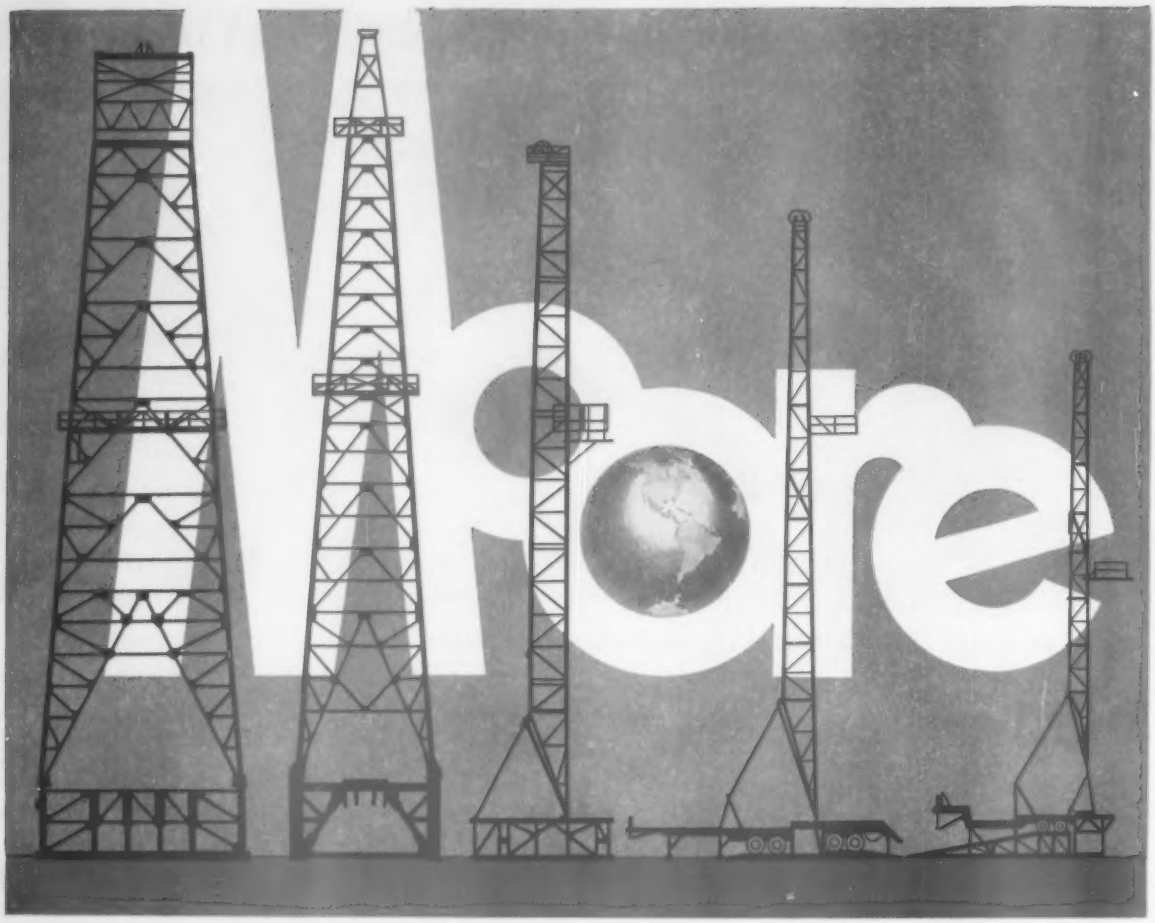
At midnight a gas sand was encountered and the well started kicking out gas, mud, and salt water into the air. The shallow-water barge began breaking up and a hurryup call was sent to J. Ray McDermott Co. for assistance. McDermott Spud Barge 4 was dispatched to help. On the barge was mounted a crawler-type crane, which was towed by the tug J. F. Revels, owned by H. F. Revels, Morgan City.

The well sanded up and the flow stopped awhile. During the lull, the rescue barge came alongside to evacuate the drilling crew. At that crucial moment, the well blew wild again, followed shortly by an explosion and fire, with flames soaring up 400 ft.

The captain of Spud Barge 4, Burton Gonzales, Sr., was killed, five men were injured by the wildly blowing flames, and two men were missing. Several companies joined in an air search for the missing men.



THE J. Ray McDermott Spud Barge 8 was used as a search base for two missing crew members. Note the Cessna 180 in the foreground.



A TYPE AND SIZE STRUCTURE FOR EVERY DRILLING REQUIREMENT

LEE C. MOORE masts have been used for drilling in the bleak Arctic regions where structures must withstand actual wind loads up to 100 m.p.h. and where special housing was furnished for protection of personnel and equipment against extreme cold.

Our trailer-mounted units have provided the maximum portability required of drilling equipment for transporting over rough desert terrain.

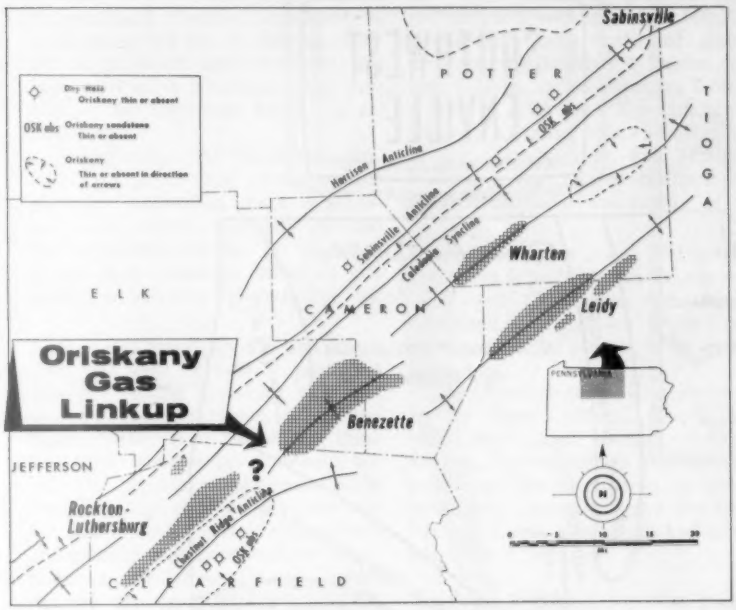
Lee C. Moore multiple well derricks have made it possible to drill a series of wells from one setting of the derrick on over-water platforms.

We have designed drilling structures to break down into sections of appropriate size and weight for transporting by helicopter and conventional aircraft into otherwise inaccessible jungle areas.

The continuing program of study and research conducted by our design engineers assures the drilling industry of structures best suited to specific requirements.

Moore | LEE C. MOORE CORPORATION

P. O. BOX 216 • TULSA, OKLAHOMA • Dallas • Houston • New Orleans • Casper • Odessa • Great Bend • Pittsburgh EXPORT OFFICE: Room 624, International Bldg., 630 5th Avenue, New York 20, N. Y. • Foreign Licensed Mfr.: Oil Well Engineering Co., Ltd., Cheadle Heath, Stockport, England



VAST ELONGATED RESERVOIRS of gas are being uncovered along the flanks of Pennsylvania's surface anticlines. Principal pay is the Onondaga chert-Oriskany sandstone at depths of 7,000-8,000 ft. Shell Oil Co. State Tract 83 well is being closely observed as a possible "linkup" between two large gas fields, Rockton and Benezette-Driftwood. Success would mean a 38-mile-long field.

Old dogs can learn new tricks

BY FRANK J. GARDNER

"WE HAVE unbounded optimism about the future of this area, and western Pennsylvania generally."

H. D. Borger, president of Peoples Natural Gas Co., Pittsburgh, expressed the feeling of many an Appalachian oil man when he made that statement in a recent speech. His confidence in the undiscovered reserves of Pennsylvania is shared by most discovery thinkers in the state.

"While we have become more and more dependent on supplies from the Southwest," Borger said, "this has not deterred our efforts in the least to locate new supplies of gas in Pennsylvania. . . . Just recently, the first deep producer was completed in Armstrong County, and, by coincidence, in the very township where Peoples drilled its first well in the county in 1893. This is a significant discovery and could possibly be the first well in a very large producing field. . . . Our own geologists foresee the day of ultradeep drilling in the Appalachian area that could bring about the discovery of new fields whose production could even rival the prolific production of the Southwest."

Deep drilling . . . That this is true is being demonstrated daily in more than one Pennsylvania county. One of the most active and interesting centers of deep drilling today lies along the Sabinsville and Chestnut Ridge anticlines in Clearfield, Elk, Cameron, and Potter counties (map). Here, for the past couple of years, 8,000-ft. wells have become commonplace, and the results have justified the search.

These deep wildcats have felt out the strat-trap reservoirs of the Oriskany-Devonian as they pinch out along the flanks of these superelongated anticlines. On the southeastern flank of the Sabinsville anticline, for example, gas finders anticipate a possible 90-mile trap in the Oriskany wedge-edge at depths betweeen 7,000 and 8,000 ft.

And big fields . . . Farther southeast, across the Caledonia syncline, lies another long structure, the Chestnut Ridge anticline, whose slopes are the scene of brisk wildcatting. At the moment, one of the most closely watched operations in the Appalachian region is Shell Oil Co.'s State Tract 83 well. It lies in southeastern Elk County, and between Rockton field on the southwest and Benezette-Driftwood field on the northeast. If successful, this key well could link the two fields into one huge 38-mile-long reservoir.

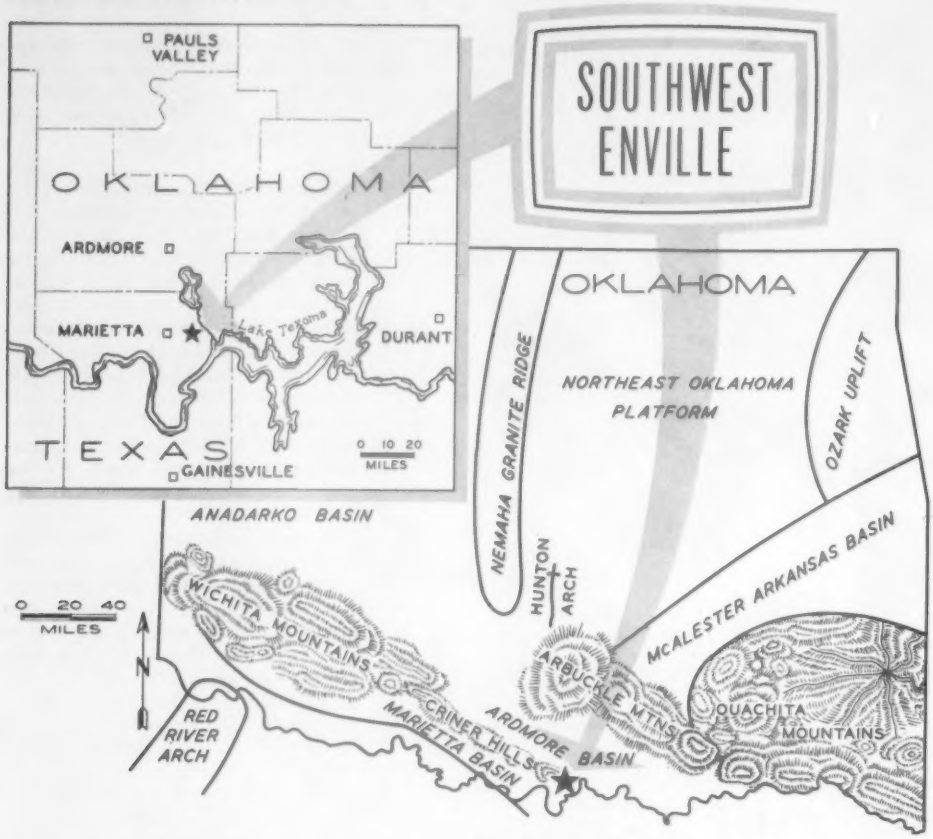
Another interesting point about Shell's operation: It is the first well to be cored in deep gas exploration in Pennsylvania . . . a biting commentary on the state of exploration here. The well found the Onondaga-Middle Devonian limestone at 6,483 ft. and the first core was taken at 6,485-6,520 ft. A second was taken at 6,520-46 ft., and a third at 6,546-55 ft. These were 4-in. cores that will be made available for public inspection after the well is finished.

Shell topped the Oriskany sandstone at 6,536 ft. and the Helderberg-Lower Devonian limestone at 6,564 ft. On drill-stem test of the Onondaga, at 6,485-6,520 ft., result was a weak blow for ½ hour, with reservoir pressure 50 psi.

Proof that this is going to be a profitable search was amply underscored recently in Rockton field (southwest corner of map). There, New York State Natural Gas Corp. reported a potential test of 70,000 M.c.f. gas per day at its 11 Helen Gordon well in Huston Township; this was the largest well yet found in this area. Production is from the Onondaga chert-Oriskany sandstone section, with total depth 7,160 ft. Rock pressure was 3,435 psi. in 19 hours. A dozen other wells are drilling in this vicinity.

Underlie optimism . . . Many another elongate anticline awaits exploration in the Appalachian province, and the results could be just as rewarding. After 100 years of oil and gas fame, this region just now is shaking hands with modern methods of drilling, coring, stimulation, and completion. Small wonder, then, that such men as President Borger express an "unbounded optimism."

PART 1 OF 2 PARTS



LOCATION map of Southwest Enville field. Fig. 1.

Structural complexities puzzle drillers at . . .

Southwest Enville—a development headache

BY C. C. REEVES, JR., W. T. PROBANDT, AND T. A. CULLINAN
Texas Technological College, Lubbock

Complexity of southern Oklahoma geology requires special techniques to unscramble the stratigraphic problems encountered. The peg model used here by one of the authors, C. C. Reeves, Jr., is an aid in deciphering the garbled picture of the formational sequence. Reeves is presently teaching structural geology and petroleum courses at Texas Tech, while seeking his doctor's degree. His bachelor and master degrees were obtained at the University of Oklahoma. Having worked with Texaco, Inc., in southern Oklahoma, he is acutely aware of problems presented at Southwest Enville.

TWO YEARS AGO southern Oklahoma was considered a poor structural-trap prospect; geologists had started to concentrate on the search for likely stratigraphic traps.

Then, in the spring of 1957, Texaco, Inc., 1 Westheimer blew in to open Southwest Enville field and to remind Oklahoma geologists that they did not yet know all that lay hidden beneath the Cretaceous overlap. It is ironical that the discovery well was a stratigraphic test searching for the strand line of the basal Oil Creek-Ordovician sand.

Southwest Enville lies in the northwestern part of Township 7s, Range 3e, 6 miles east of Marietta, Love County, Oklahoma (Fig. 1). Occupying Sections 7, 17, and 18, the field is 2 miles long and 2 miles wide but is still being developed.

Significant basal Oil Creek sand discoveries to the northwest (Sun Oil Co. 1 Brahma, Section 35-6s-2e) and to the northeast (Sinclair Oil & Gas

Co. 1 Tucker, Section 32-6s-3e) give promise of areal extension.

Basal Oil Creek sand discoveries to the southwest (Pasotex Petroleum Co. 1 Brannon Unit No. 5, Section 24-7s-2e) in Southeast Marietta field, are apparently on a structural trend parallel to the Southwest Enville structure.

Geologically, the Southwest Enville area is on the southeastward-plunging Criner Hills which, in southern Love County, disappear beneath the Cretaceous overlap. To the north is the deep Ardmore basin, to the south the Marietta syncline (Fig. 1).

Author was there . . . The senior author was one of several geologists who sat on the discovery well and also on Texaco's Noble, Rose, and Dexter wells. It is hoped that these first-hand observations will help not only to explain development problems in a high-pressure gas reservoir, but also to clarify certain sedimentary and tectonic aspects of southern Oklahoma; most of these still remain hidden by the Cretaceous overlap. Finally, the authors wish to call attention to the discovery of a major trend in an area which has for years been considered void of any possible reservoir structure of any magnitude.

History of Discovery

Two earlier dry holes in the Southwest Enville area were Texaco's 1 Conrad, Section 17-7s-3e, just 1,452 ft. from the Westheimer, and the Magnolia Petroleum Co. 1 Stewart, Section 7-7s-3e.

The Conrad was off structure for the Sycamore pay and too shallow for the basal Oil Creek sand. The Stewart was too high on structure, the Sycamore having been eroded and also was too shallow for possible basal Oil Creek pay.

After theorizing that the basal Oil Creek sand strand line must pass close to Marietta, Texaco drilled the discovery well—1 Westheimer—in the fall of 1956, completing in March 1957.

The Westheimer gave no more than the usual deviation troubles until it blew out at 8,785 ft. after unknowingly cutting 14 ft. of basal Oil Creek sand. Attempts to control the well by mud were unsuccessful and after a second blowout, the basal Oil Creek sand was sealed off by cement. Whipstock was then set and the new hole taken, with heavy mud, into the basal Oil Creek sand.

Final test through ⅛-in. choke was 58 bbl. of distillate in 10 hours. Tubing pressure was 3,800 psi.; shut-in tubing pressure was 4,200 psi. Because the ⅛-in. choke froze, a 10/64-in. choke was put on; production was then 60 bbl. of 58°-gravity distillate in 7½ hours, tubing pressure 4,500 psi. with a gas-oil ratio of 16,500:1.

Discovery was confirmed shortly thereafter by Texaco's 1 Dexter, Section 7-7s-3e. Initial potential through a 7/64-in. choke was 37.6 bbl. of distillate in 11 hours with 1,016 M.c.f.d. of gas. Gas-oil ratio was 12,392:1. Following the Dexter confirmation, field development was rapid.

Post-Mississippian . . . The surface formation is probably the Trinity sand of Lower Cretaceous age, though Goodland, Kiamichi, and Duck Creek are known to be present in the immediate area.

The Pennsylvanian is represented by the Hoxbar (lower), Deese, Dornick Hills, and perhaps Springer Groups. Little attention has been paid to the post-Mississippian in the Southwest Enville area, though a few Hoxbar and Deese tops are picked in the Magnolia 1 Stewart.

Pre-Pennsylvanian . . . The normal pre-Pennsylvanian sedimentary section of southern Oklahoma is present, though no normal thicknesses for the Southwest Enville area can be quoted: faulting, fault drag, exaggerated dips, and erosion have seen to that.

The pre-Pennsylvanian section (Fig. 2) contains many distinctive markers. The Mississippi-Caney is an unmistakable sooty, blue-black, micaceous shale which, because of calcite and phosphatic inclusions, may halfway resemble the Woodford shales. The Sycamore exhibits its characteristic milky-white color along the sample edges and fracture planes while the underlying Woodford shale shows its usual sporelike inclusions.

The Sylvan shale, because of its characteristic green color, is another distinctive stratigraphic marker. The underlying Viola limestone has received significant attention with the March 1959 discovery of Viola production just 2 miles north of the Southwest Enville area. The Pan American Petroleum Corp. 1 Merrick Unit, Section 31-6s-3e, tested a 114-ft. section of Viola, recovering 50 bbl. of oil.

Oil Creek subdivisions . . . The Oil Creek formation is usually divided into two stratigraphic units, an upper coarsely crystalline gray limestone which has been termed the "bird's-eye lime" and a lower sandstone and shale sequence.

In the Southwest Enville area the Oil Creek may be divided into three stratigraphic units. The upper member comprises about 210 ft. of buff, coarsely crystalline, silty limestone cemented by chalky calcium carbonate.

The predominance of black quartz grains cemented by the carbonate has given rise to the term "bird's-eye lime" for this part of the section, though this is not to be confused with the original terminology of the eastern U. S.

Beneath this upper member occurs approximately 800 ft. of waxy green shale, interbedded with black calcareous shales, both of which give way to very soft gray-green laminated shale in the lower few hundred feet.

The lower member itself may be subdivided; the upper unit is approximately 80 ft. of coarsely crystalline, black, sandy, and pyritic limestone with interbedded dirty black-gray, fossiliferous (ostracods), shale lentils. The lower unit is the basal Oil Creek sand which constitutes the major pay in the field.

The basal Oil Creek is a fine to a very fine-grained, well-consolidated, calcareous sand. The grains are subrounded to rounded and show a light to dark-brown stain.

It was thought that no basal sand was found in the samples of the Westheimer because of its fine grain size and unconsolidation, but the authors concur, from extensive examination of the section, that even if the sand pieces were present they would probably be indistinguishable as a sand because of fine grain size combined with the low-power binoculars usually used at the well site.

The first samples of basal Oil Creek sand were recovered by the senior author shortly before shutting in the Texaco 1 Dexter. A fine-mesh Baroid screen was used in the flow line to insure the catching of any fine unconsolidated sand; examination was made with a high-power pocket lens.

Oil Creek thickness varies from a probable 2,000 ft. to less than 1,000 ft., the normal considered to be about 1,100 ft. in this area. Of this thickness, the basal sand accounts for 90-100 ft.

Considerable thickness variations may be quoted for the Oil Creek section because of the many thrusts which cut it. True thickness is then necessarily dependent on the correct identification of the added section, a problem of considerable magnitude in the Texaco 1 Noble, Rose, Green, and Voris.

Until August 25, 1958, the Joins formation was the oldest penetrated at Southwest Enville. Then, late in August, Shell 1 Sadler Unit drilled into the Arbuckle formation, recording a thickness of 304 ft. for the Joins.

The Arbuckle is the oldest forma-

tion drilled at Southwest Enville. Since only 170 ft. has been cut, the drilled Arbuckle section is considered to be of Ordovician age.

Regional Structure

Southwest Enville apparently straddles an appendage, or perhaps the buried plunging nose of the Criner Hills proper, though the main axis has long been mapped 5 miles north of the field area. To the south lies the Marietta syncline, to the north the deep Ardmore basin, both of which trend northwest-southeast. Regional faults parallel these structural features.

Geologic History

Oklahoma experienced little or no orogenic activity during the early Paleozoic, but after lower Pennsylvanian deposition, the three mountain systems of the state, the Wichita, Arbuckle, and Ouachita were forming.

Shortly after deposition of the lowermost Pennsylvanian Morrowan series, the Amarillo-Wichita-Criner Hills trend was thrust northward forming the well-known Lester-Bostwick hiatus. The whole trend probably remained emergent until mid-Des Moines time, during which time erosion cut down to at least the Arbuckle in the western part of the trend and to the pre-Pennsylvanian sediments in the Southwest Enville area.

As a result the Dornick Hills conglomerates which now surround the Criner Hills consist of pre-Pennsylvanian material derived from sediments which now crop out along the flanks of the Criner Hills trend. Finally, late in earliest Des Moines time, the shales, sands, and limestones of the upper Dornick Hills were deposited.

After deposition of the upper Dornick Hills limes, sands, and shales, the Criner Hills trend was once again thrust above sea level, causing the unconformity now found at the base of the Deese formation. Because a basal Deese conglomerate is found to thicken to the southeast, and because this conglomerate is similar to the Ouachita facies, it is supposed that the movement at the end of upper Dornick Hills time was caused by Ouachita thrusting. Slight uplift is recorded after deposition of the Deese sediments, principally in the Fox-Graham and Greenville areas.

The Hoxbar sea then advanced during lower Missourian time depositing the shales, sands, and limestones of the Hoxbar-Canyon group. Late in Virgilian time the Arbuckle Mountains were formed, the resultant erosion producing the conglomerates, breccias, and granite washes of the lower Pontotoc Group.

COMPOSITE LOG of pre-Pennsylvanian section at Southwest Enville is influenced by faulting, fault drag, steep dips, and erosion. Fig. 2.

The last movement of the Amarillo-Wichita-Criner Hills chain occurred probably in Leonardian-Guadalupian time when the now low structures were rejuvenated. Encroachment of the Cretaceous seas then followed.

Major Reservoir Characteristics

The major reservoir in Southwest Enville field is the basal Oil Creek sand of Lower Ordovician age.

The discovery well, Texaco 1 Westheimer, drilled 14 ft. into the Oil Creek sand before it blew out, recovering none in the samples, supposedly because of fine grain size or unconsolidation. Even with the necessary precautions the Westheimer whipstock failed to produce any recoverable cuttings of basal Oil Creek sand.

MicroLog examination of the Westheimer shows 80 ft. of sand with uniform porosity, except for two thin nonporous zones, one at 8,690 ft., the other at 8,722 ft. Electrical-log examination indicates that these two thin nonporous zones probably separate the oil column.

The basal Oil Creek sand in Southwest Enville is a fine to medium, subrounded to rounded sand. The sand characteristically drills 4-5 minutes per foot which is a distinct drilling break from the 15 minutes per foot for the overlying shaly lime-limy shale. In sand recovered by the senior author from the Texaco 1 Dexter, excellent odor and stain occurred with bleeding gas.

The basal Oil Creek sand produces a distinct electrical-log pattern. In self-potential the sand shows a drop of 35 mv., the short normal rises to a peak of 350 ohms, the long normal to a peak of about 6,000 ohms, and the lateral to about 6,550 ohms.

Basal Oil Creek sand produces by solution gas drive. Tubing pressure has been as high as 4,300 psi. Gas-oil ratio is variable, but usually runs 12,000-16,000:1. The oil has an API gravity of approximately 58.4° Initial production tests are also highly variable but those of Texaco 1 Dexter might be considered representative. Initial production was 85 bbl. of distillate in 24 hours through a 7/16-in. choke with 1,016 M.c.f. of gas.

Sycamore . . . The minor reservoir in the field is the Sycamore limestone. Unlike the basal Oil Creek sand, the Sycamore must be treated for commercial production. Sycamore production for Texaco's Lena B. Green well stabilized at 5½ bbl. of oil per hour through a ¾-in. choke, with 314 M.c.f.d. of gas.

Bromide . . . The lower Bromide sand zone, 4,274-92 ft., is productive only in Texaco 1 Voris.

Viola . . . Recently, production was established in the Viola limestone by Pan American 1 Merrick Unit, Section 31-6s-3e, 2 miles north of Southwest Enville's northern limits. While this production is not now within the limits of the field, it is obviously structurally related to those same movements which caused Southwest Enville structure and accumulation.

Several other zones have produced attractive drill-stem test results at Southwest Enville. The Hunton lime interval of the Pasotex 1 Belle Green yielded oil-cut mud, and a show of gas at Texaco 1 Noble Foundation. The McLish of Texaco 1 Voris flowed 320 M.c.f.d. of gas through a 22/64-in. choke and 635 M.c.f. through a ½-in. choke after fracturing. The McLish of Texaco 1 Green swabbed 41 bbl. of oil after fracturing.

Drilling and Completion

The greater part of Southwest Enville field has to date been developed by Texaco. Normal heavy-duty rotary tools are used, either with a jackknife or standard derrick.

A heavy oil-base mud, sometimes up to 15 lb., is used to control the extreme pressures. Because of steep dips, often greater than 30°, crooked-hole problems develop in most wells.

The casing program for the Oil Creek wells, though variable, is gen-

erally 13⅜-in. surface string to about sea level followed by a few thousand feet of 5⅝-in. intermediate. Five-inch is then run to pay. No treatment or pump is necessary for the basal Oil Creek sand production.

For the shallow Sycamore production, approximately 700 ft. of 7 to 9⅝-in. surface string is set; 4½-in. is then taken to pay. Though the Sycamore may flow, it is usually treated with acid.

(Editor's note: Part 2 of this article is devoted to a structural analysis of Southwest Enville and its possible impact on future exploration in Southern Oklahoma. It will appear in the September 7 issue.)

Third producer for Oklahoma's Cimarron

New Southeast Burton field in southeastern Cimarron County in the far northwestern corner of Oklahoma has its third producer.

The new well is C. L. McMahon's 1 Hetherington in C SW NE 30-4n-9eCM, 2 miles south of Golf. It pumped 139 bbl. of oil daily from perforations at 4,473-80 ft. in Morrow Pennsylvanian. This new field is a Middle Morrow producing area and is near the growing Griggs area, a multipay gas and oil area.

GAS-CONDENSATE production was tapped at a Comanche County wildcat in southwestern Oklahoma.

New field opened in Sooner's Comanche

FAULT-ZONE area gas-condensate production was established north of West Burns field in southwestern Oklahoma's Comanche County. The discovery well is Woods Petroleum Co. 1 Hix in C SE SE 21-3n-9w, 2 miles north of West Burns.

The operator flowed 3,800 M.c.f.d. from 5,202-20 ft. in Cisco Pennsylvanian sand. The flow was 5,250 M.c.f.d. in 10 minutes with a spray of condensate.

This new pool-opener is in an area of highly faulted strata which trends northwest-southeast. There have been several important discoveries in the area in the past few years, most of them in deeper Ordovician rocks.

Exploration in Rockies sets fast pace

EXPLORATION in the Rocky Mountain states continues strong despite strikes in the industry and in steel. With summer nearly gone, activity is running smoothly in all areas.

Wyoming . . . Gas discoveries highlight drilling success here. The California Co. completed a shallow gas strike at Cooper Reservoir in Natrona County for 8,000 M.c.f.d.

Gulf Oil Corp. has a discovery at State Line Unit in Sweetwater County, 4 miles southwest of the discovery well on this block. Sohio Petroleum Corp. has an indicated success in Mesaverde Cretaceous at Cow Creek southwest of Rawlins. The fourth gas well was completed at Trail Unit in the Green River basin by Mountain Fuel Supply Co. All four wells have good potentials, making this area one of the best for future development in southwestern Wyoming.

Other Green River basin activity includes the first deep test at LaBarge field. Texaco, Inc. has a Frontier well going in the field—the first here to this zone. El Paso will drill two wildcats and a 2-mile extension to the southeast of Desert Springs. The wildcats will go down on the Bridger Hill Unit and at Patrick Draw in Sweetwater County. Bridger Hill is the biggest unit ever approved in Wyoming.

Drilling will pick up in the Powder River basin. Nine wells are planned in Niobrara and Weston counties by one operator. A Pennsylvanian try is slated for Lonetree Creek. On the west side of the basin north of Sherwood field, an extension well flowed 4,500 M.c.f.d., and 500 bbl. condensate through choke. There was also Tensleep Pennsylvanian success at Southeast Tisdale field.

A Max Pray well in the Big Horn basin is being called most significant by regional operators. The strike is a 2-mile south stepout to production at Big Polecat. Pray got both oil and gas from the Tensleep and Frontier, respectively.

Williston . . . South Dakota developments lead the way here. Shell completed a new Red River Ordovician pool 5 miles south of Buffalo field in Harding County in the northwest portion of the state. This new strike is separated by one producer from Buffalo field.

In Montana, a much-needed drilling program is proving its worth. Texota Oil Co. got a 700-bbl. well at the southwest end of Richey field. This follows a 1,000-bbl. well completed earlier in the summer. Carter Oil Co. will go to 10,700 ft. in Ordovician about 14 miles east of East Poplar field in Roosevelt County. Nearest similar oil is 20 miles north at Outlook field in Sheridan County.

Pennsylvania Shallow Well Completions 2nd Quarter 1959

County—	Oil		Gas		Water input		Dry holes	
	Wells	Footage	Wells	Footage	Wells	Footage	Wells	Footage
Armstrong	..	.....	17	53,266	..	.....	1	3,184
DD†	..	.....	4	3,286	..	.....	..	.....
Clarion	..	.....	3	8,432	..	.....	..	.....
DD	..	.....	1	1,547	..	.....	..	.....
Clearfield	..	.....	1	1,992	..	.....	..	.....
Clinton	..	.....	1	1,240	..	.....	..	.....
Elk	..	.....	2	4,382	..	.....	..	.....
Greene	..	.....	..	.....	..	.....	1	3,012
Indiana	..	.....	2	6,974	..	.....	1	4,052
DD	..	.....	2	4,066	..	.....	..	.....
Jefferson	..	.....	5	14,595	..	.....	1	2,900
McKean	32	61,261	1	1,932	25	50,584	1	1,480
Venango	1	1,066	..	.....	..	.....	..	.....
Warren	2	2,142	..	.....	..	.....	..	.....
Washington	..	.....	1	2,763	..	.....	..	.....
Westmoreland	..	.....	11	38,783	..	.....	1	1,585
Total	35	64,469	51	134,359	25	50,584	6	16,213
DD	..	.....	7	8,899	..	.....	..	.....

DD† = wells drilled deeper.

Oil in Australasia:

Here's a report on petroleum prospects in 17 nations

Oil provinces in Australasia are comprised of varying categories from brilliantly promising grading downwards to the downright discouraging. One thing is certain—not a single area can be written off the books—without more exploration or a greater density of drilling. Exploration and drilling activity generally should increase over previous years.

Afghanistan

On a generally quiet scene, reports indicate that the Sar-I-Pul 2 well drilling in northern Afghanistan had shows of oil and gas. The Afghan Ministry of Mines and the Russian TCGNO Export Co. culminated an exploration agreement for the Russians to investigate the northern portion of the country. A U. S. firm conducted aerial photo surveys for the Afghan government and U. S. technical aid was requested in drafting a petroleum law.

The Turkoman basin, lying north of the Hindu Kush Mountains shows promise for production in that it offsets important producing fields in neighboring USSR. Surveys indicate that at least some 4,000 ft. of Lower Tertiary and Cretaceous sediments appear to be present in this area.

The current year, 1959, should see an increase in both exploration and drilling.

West Pakistan

Eight companies were active in 1958. A total of 15 exploratory tests were being drilled. Production for 1958 in the Punjab area exceeded 2,270,000 bbl. Annual gas production at Sui field was over 15 billion. Seismic was the leading exploratory tool, followed by geological and gravity surveys.

Operators in the country include Pak-Stanvac Petroleum Project (Pakistan government and Standard-Vacuum Oil Co.), Pakistan Petroleum, Ltd., Attock Oil Co., Pakistan Sun Oil Co., Pakistan Oilfields, Ltd., Hunt International Oil Co., Pakistan Shell Oil Co. and Tidewater Oil Co.

Minor production has been established for some time in the Potwar basin in the northern extremity of West Pakistan. More recently significant gas accumulations have been found in West Pakistan. The foothills area of the Sulaiman and Kirthar ranges will be explored.

In addition to geological surveys, seismic reflection and refraction, and gravity surveys, aerial photography gained momentum as an exploratory tool.

Signs indicate exploration will continue at a brisk pace during the current year.

East Pakistan

Seismic exploration continues to be the leading exploratory method and three companies are active. They are Pak-Stanvac Petroleum Project, Pakistan Petroleum, Ltd., and Pakistan Shell Oil Co.

The west portion of the great Naga Hills-Arakan geosyncline is under investigation for possible producing structures.

Pakistan Petroleum 1 Lalnai was abandoned as a dry hole in February 1958 at a total depth of 9,813 ft. The test was drilled southeast of Dacca. Pakistan Petroleum has scheduled a test well at Chhatak near the northeastern border of the country. Further drilling is likely in 1959.

Thailand

The Mae Sot oil-shale deposits are considered of commercial aspect which would warrant building of a plant capable of processing 6,000 bbl. a day. These shales of Tertiary age are located in northwestern Thailand near the Burma border. The Muang Fang oil seeps also occur in a valley of Tertiary gravels. Although oil obtained from the seeps has been used for over 100 years, numerous attempts have been made since 1920 to obtain commercial production there. A 1,000-bbl. per day refinery is proposed in the Muang Fang area. A drilling program of 30 or 40 shallow wells has been contracted for 1959 completion. The wells would range from 800 to 1,500 ft. in depth, and it is estimated that two wells have pumped approximately 40,000 bbl. of 14.4°-gravity oil during the past 3 years.

Three prime areas due to receive production evaluation are the small Mae Fang basin in the extreme north, the Korat Plateau, and the Mae Nan Valley.

The Korat Plateau in northeastern Thailand has a thick series of Triassic sediments. Source rock beds are not known in the area, and it will take more exploration to determine the commercial aspects.

The Mae Nan Valley is known to contain largely continental Quaternary beds; whether an appreciable thickness of marine Tertiary occurs at depth is an unknown factor.

India

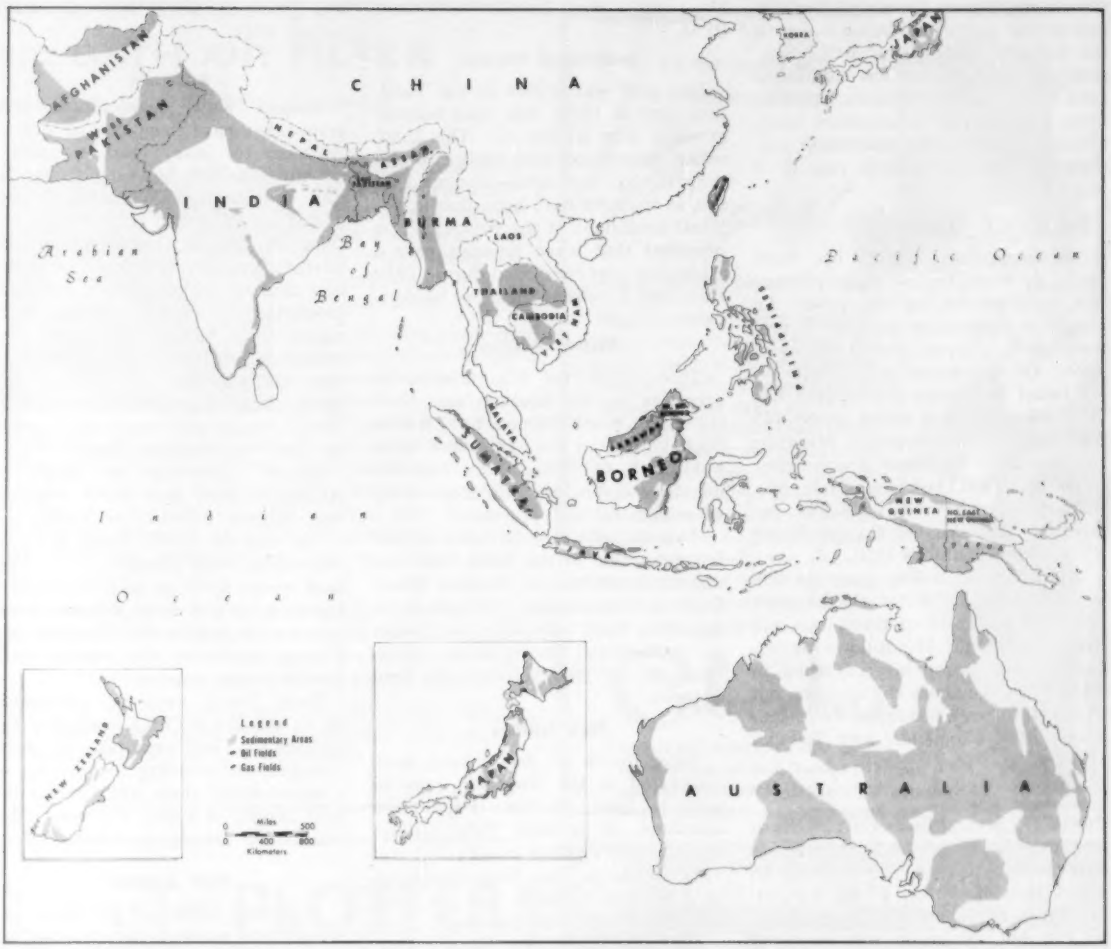
The Oil & Gas Commission is quite active in the country. In the province of Assam in northeastern India production was estimated at over 3,000,000 bbl. in 1958, an average of 8,500 bbl. per day. The commission used three deep-well rigs and some light rigs to drill projects in western India and north of Calcutta in eastern India in West Bengal Province.

Indo-Stanvac Petroleum Project conducted seismic surveys and a three-well drilling program in the Ganges River area of West Bengal Province.

The Assam Oil Co. completed seven extension and development wells in the neighborhood of Nahorkatiya in the extreme northeastern sector of Assam Province. All were producers.

In the Moran area, Assam Oil completed four of five ventures as producers, three oil and one gas. Some development was done in the Digboi field by Assam early in 1959.

Oil India (Private), Ltd., a company held jointly by the government of India and Burmah Oil Co., was formed for the development of the Nahorkatiya, Hugrijan, and Moran



AUSTRALASIAN sedimentary areas are shaded on the map. These are prime targets for exploration and future drilling. Some portions are already productive and many more will likely become new oil provinces. Adapted from a map by P. Leicester, senior geologist, Royal Dutch-Shell Group, which accompanied a paper he presented at ACAFE Petroleum Symposium, New Delhi, December 1958, as a U. K. delegate.

concessions. Oil India will also provide for transportation of crude to refineries which are to be built. The government will build two refineries, one in Assam and the other at Barauni. Oil India is owned two-thirds by Burmah Oil Co. and one-third by the government.

A promising outlook is believed to exist for India in both exploration and development during 1959.

Burma

A seismograph high in the southern portion of the country was drilled on the delta of the Irrawaddy River by Burmah Oil Co. The test was abandoned at 11,900 ft. as a dry hole. A favorable section drilled has encouraged a proposed test 20 miles southeast. To the north at Ondwe, two wells were drilled and following favorable high-pressure gas shows production tests are being run.

The Syriam refinery continued operations throughout 1958 with crude from the Chauk and Lanywa fields to the north. Burma oil production increased from 2½ million barrels in 1957 to nearly 3 million barrels at the end of 1958. Total production for the country was nearly 3.2 million barrels or 8,700 bbl. per day. Further drilling and some seismic work will continue through 1959. Irrawaddy Delta is being explored with the reflection method.

Laos

Reports indicate that a French company has negotiated a contract with the government of Laos to explore for oil. A 2-year contract with exclusive rights is reported as part of the terms.

Cambodia

Chinese Communists are reportedly searching for oil indications in Central Cambodia. The report is unconfirmed.

Extreme southwestern Cambodia appears as the most favorable locale for presence of sedimentary sections. Much of the country is comprised of metamorphic rock and igneous intrusions.

Philippines

A number of relatively small Tertiary basins exist throughout the Philippine Archipelago. Some of these have yielded small oil shows and gas in the wells drilled. A few have had oil seepages. Although no commercial production exists at present, it is quite likely that within the next few years commercial aspects will be uncovered (see OGJ, Aug. 17, 1959, p. 255).

Formosa

Deep drilling is planned for the island in 1959. A 15,000-ft. rig is being shipped from the United States. The Chinese Petroleum Corp. has

shifted its interest from the foothills belt of the central mountain range to the western flood-plains area. Seismograph exploration has continued since 1957. Oil production in Formosa has dropped to an almost insignificant amount. Gas production continues at an approximate rate of 3 M.c.f.d.

Japan

A concentrated effort has been made to boost Japan's daily production to triple its current yield. An extensive exploration program is proposed over a 5-year period ending in 1961. Of importance is the discovery by Japan Petroleum Exploration Co. at its SK 1 Fukura which tested 445 bbl. per day. Development offsetting the discovery has been discouraging.

During 1958 Japanese crude production averaged over 7,000 bbl. per day with Teikoku Oil Co. producing 95% of the country's total.

An offshore drilling program will be conducted 2½ miles off the coast of Honshu. Depth of these tests will average 6,000 ft. This follows the offshore seismic program conducted in 1956-57. Companies still carrying out exploration work are Japan Petroleum Exploration Co., Ltd., and Teikoku Oil Co.

Sumatra

North . . . Several fields exist in North Sumatra. Reports have been received that certain interests are striving to rehabilitate the former BPM oil fields. In June 1958, an oil shipment of 13,250 bbl. of crude was delivered in Japan. It is not known whether this was a single shipment or whether others have also occurred.

Central . . . Caltex Pacific Oil Co. completed 36 miles of 30-in. pipeline from Duri field to a terminal at Dumai. The deep water port is now equipped to handle giant tankers and has tankage for a million barrels of crude storage. Duri field is capable of producing 100,000 bbl. per day.

Another 8-in. pipeline from the Lirik area to Bautan was in use during 1958. Production at Lirik was approximately 20,000 bbl. per day last year.

South . . . New oil laws are pending by the Indonesian government which will divide concessions into three classes. They are: government-operated, joint government and private-enterprise operations, and exploration and development licenses similar to those now in force.

Crude production declined last year below the 1957 level.

Companies now operating here include Standard Vacuum Oil Co., Pet. Mij., and a Shell Oil Co. subsidiary, BPM.

Indonesian Borneo

One well was drilled in the Tandjung field in 1958. The total number of wells here is now 32. This field, which was discovered before World War II, has not been developed as fast as it might have been due to political conditions in the country. It is proposed that when tensions ease a 20-in. line may be started during 1959 from the Tandjung field to Balikpapan.

British Borneo

Three Shell Oil Co. subsidiaries operating in the country are: Shell Oil Co. of North Borneo, Ltd., Brunei Shell Petroleum Co., Ltd., and Sarawak Shell Oilfields, Ltd. Together the three companies produced nearly 40 million barrels per year.

Two important wells were drilled last year, one in the Seria field and the other offshore at Hankin Shoal. Both were abandoned. Outlook is for the three Shell subsidiary companies to concentrate on offshore areas. Much of the land holdings has been dropped.

New Guinea

Three small oil fields have been discovered in the Vogelkop area of western New Guinea. Exploration continues in western New Guinea outside the Vogelkop locale.

In Papua gas has been discovered in a number of wells, but no commercial oil has been obtained.

In Netherlands New Guinea average daily production is approximately 5,000 bbl. per day. It has continued to drop since the fields were discovered prior to World War II. A great deal of money has been spent in exploration, and the results have been discouraging. This is rugged country with a hot, humid climate and average rainfall of 350 in. per year.

In the Klamono field, two development wells were drilled and both were small productionwise. Three exploratory tests were drilled dry, although small gas shows were encountered in one. The tests were drilled by NNGPM, a combine formed by Shell, Standard-Vacuum, and Caltex oil companies.

Companies operating in Papua are Australasian Petroleum Co., Ltd., Island Exploration Co., and Papuan Apinaipi Petroleum Co. IEC drilled two wells, both with shows of gas. APC drilled two wells, one with a show of gas and the other with gas and testing 70 bbl. of oil per day. The lone effort by PAPC was a shallow test which was abandoned as dry. Small amounts of both geophysical and geological work were conducted during 1958.

Australia

Despite active exploration programs that have been carried out in Australia for many years, the country still does not have a commercial well. Although a Cretaceous sand drilled in 1953 had a promising oil show in the northwestern part of western Australia, it would appear the best chances for ultimate commercial production lie in the Paleozoic sediments. Over 60,000 ft. of hole was drilled during 1958, a sizable increase over the previous year. Under the terms of the Australian Government, certain stratigraphic tests may qualify for 50% government subsidy.

Nearly 2,000,000 sq. miles of Australian land was under exploration, license permits, or application at the end of 1958. Focal point of interest has been primarily in Queensland where 43% of total exploration survey work was done. Greatest footage was drilled in the Canning and Fitzroy basins in the northwestern portion of the country.

Delhi Taylor interests, represented by its subsidiary Delhi Australian Petroleum Co., will undertake an extensive project including the drilling of a minimum of three wells during the next couple of years. Outlook is for accelerated interest in Australia.

New Zealand

Following 3 years of geological and geophysical work, a test location has been chosen for drilling in 1959. The operating group, consisting of Shell, British Petroleum, and Todd Oil Services, Ltd., has 5,574 sq. miles under concession on the west side of North Island. This will be a 12,000-ft. proposed test, the first since World War II.

Previously some very small noncommercial production was obtained from wells at New Plymouth area on North Island. Concessions are held on South Island by British Petroleum Co. and Todd Oil Exploration, Ltd. Both geological and gravity work are under way on some of these blocks.

Acknowledgment

Part of the data used in this review was provided through the cooperation of Asiatic Petroleum Corp., New York.

Bibliography

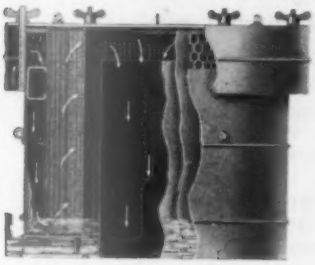
Hotchkiss, Henry, Bull. AAPG, July 1959, Vol. 43, No. 7, pp. 1707-33.

Kaufman, Godfrey F., Bull. AAPG, July 1959, Vol. 43, No. 7, pp. 1714-32.

Leicester P., "Requirements for Success in Oil Exploration and Development." ECAFE Petroleum Symposium, New Delhi, Dec. 1958, pp. 21-24.

OIL BATH AIR FILTER

for engines, compressors and blowers



The Air-Maze Type F filter provides efficient removal of fine dirt from intake air to reduce wear on engine, compressor or blower parts.

High dirt removal efficiency is attained through its thorough scrubbing action. This scrubbing action is created by directing dirt-laden air into intimate contact with an oil pool. A "manometer" action created by the air passing a continuous baffle within the pool, causes more oil to be re-cycled than on other types of filter designs. Any dirt that remains in the air is then impinged on metal baffles. The metal baffles are kept clean by constant wash of the oil bath.

Flexible in design, the Type F filter can be furnished with top or bottom outlets, with or without relief valves to handle compressor unloading or line surges. Where noise reduction is a factor, the filter can be furnished with silencing chamber.

Available in sizes from 20 to 6650 cfm. Write Air-Maze Corporation, Cleveland 28, Ohio. Dept. OJ-8. (Subsidiary of ROCKWELL-STANDARD Corporation)

In the heart of downtown Miami...

Elegant

"Away from home" living

Magnificent bayfront accommodations—one-of-a-kind rooms and suites, designed for connoisseurs, comfort seekers, cosmopolites from the world over!

"Summit" meetings of top people . . . every day at the world-famed Top O' the Columbus, 17 floors up! Gourmet fare, rare wines from the Columbus wine cellar; spectacular views of ocean, city, and bay!

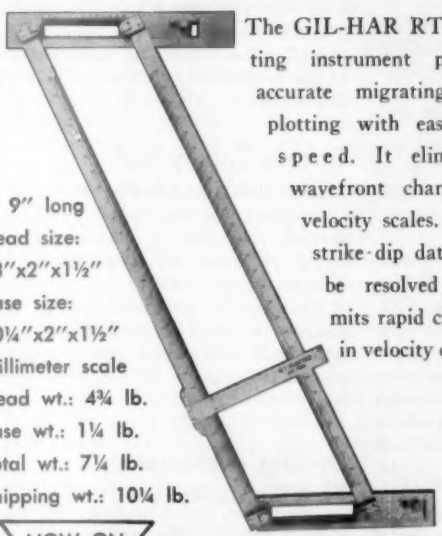
Heart-of-downtown convenience. Airlines terminal; near smart shops, theaters and offices.

Completely Air Conditioned

THE Columbus HOTEL

Biscayne Blvd. at First Street, Miami, Florida
For reservations, call Miami, FRanklin 3-2671
AMERICAN EXPRESS CHARGE CARDS ACCEPTED

RESOLVED TIME PLOTTER



The GIL-HAR RT Plotting instrument permits accurate migrating and plotting with ease and speed. It eliminates wavefront chart and velocity scales. More strike-dip data may be resolved; permits rapid changes in velocity curves.

2' 9" long
Head size:
13"x2"x1½"
Base size:
10¼"x2"x1½"
Millimeter scale
Head wt.: 4¾ lb.
Base wt.: 1¼ lb.
Total wt.: 7¼ lb.
Shipping wt.: 10¼ lb.

NOW ON SALE AT

Write for folder and instruction sheet

J. A. BLACKWOOD CO.

924 S. Detroit — Tulsa, Oklahoma

SIVC

CONTINUOUS SPIRAL SCRAPER

LONGER SPIRAL circles rod each 15"

PLASTIC COATED

REVERSE SPIRAL at center

NO WELDING ON RODS

TAPERED WING-ENDS protected by shoulder of rod

NOW FIELD INSTALLED AT NO EXTRA COST!

Slash downtime and transportation costs. We install orders of 40 or more at shop prices! . . . just **25c per rod ft. installed.**

This unique full-length scraper cuts hot-oiling to the irreducible minimum. On hundreds of wells, it's **proven** 3-WAYS BETTER:

1. MOVES MORE PARAFFIN! Longer spiral means stronger flow, less foothold for clinging paraffin.

2. SAVES TIME! Run it fast; tapered, protected ends can't hang.

3. PROTECTS RODS! Full-length design stops damaging vibration. Reverse spiral prevents unscrewing. No welding on rods.

For literature or details, contact us or one of these dealers:

MT. PLEASANT, MICH......National Supply
SHREVEPORT, LA......Noel E. Coburn
HOBBS, N. M......Badger Bit & Specialty

SUNSHINE IRON WORKS

601 W. Murphy, ODESSA, TEX., FE 7-6651

Write for catalog on our full line of Paraffin-Control Equipment.

IN TEXAS Cabot Carbon Co.'s discovery in Reagan County is between the southeastern tip of the Spraberry Trend and Stiles field. Nearby dry holes were drilled to the Ellenburger.

Deep production opened off Spraberry fields

ELLENBURGER production has been opened between Stiles field and the Spraberry trend in Reagan County, West Texas.

Cabot Carbon Co. 1 Zuletta Hughes, Section 5, Block L, TCRR Survey, flowed as high as 34 bbl. of oil an hour on tests, and was completed for 182.5 bbl. a day. The final gage was through 23/64-in. choke, from open-hole section at 10,416-62 ft. Flowing pressure was 450 psi., gravity was 59.3° and gas-oil ratio was 3,090:1.

The new producer is 1¾ miles northeast of Stiles townsite, on a 560-acre lease. Cabot Carbon's well is 2 miles northwest of Ellenburger production in Stiles multipay field, but separated by Ellenburger failures.

Texas' Ochiltree gets Cleveland gas

New Cleveland sand gas production is reported at a wildcat in central Ochiltree County in the Texas Panhandle. The discovery well is Shamrock Oil & Gas Corp. 1 Sam Damshues et al. in Section 741, Block 43, H&TC Survey.

The well flowed 5,100 M.c.f.d. from perforations at 7,084-7,108 ft. in the Cleveland Pennsylvanian sand. Location is 8 miles southeast of Perryton and 3½ mi'es south of the Ellis Ranch field, also a Cleveland producer.

Panhandle well taps Morrow pay

First upper Morrow Pennsylvanian production was opened in Lipscomb County, Texas Panhandle.

The discovery well is Irvin Production Co. 1 Mrs. A. R. King in Section 679, Block 43, H&TC Survey. This wildcat is 11 miles west of the town of Lipscomb, 5 miles southwest of Tonkawa gas production at Kiowa Creek, and 5½ miles northeast of basal Morrow gas production in Merydith field.

The operator took completion gage getting a calculated absolute open flow of 15,500 M.c.f.d. from perforations at 8,976-99 ft. The well also flowed 9½ bbl. condensate per million cubic feet.

Texas' Ector well is county's first triple

Ector County, West Texas, gained its first triple completion at Phillips Petroleum Co. 6-A TXL, in the TXL multipay area. Combined daily potential was 889.3 bbl.

Completion gage on the Tubb zone was 171.24 bbl. of 35° oil a day through 18/64-in. choke. Pay was perforated at 6,160-6,434 ft. The well extended Tubb pay ½ mile to the northwest.

Flowing potential on the San Andres pay at 4,450-90 ft., was 397.8 bbl. of 35° oil a day through 21/64-in. choke. It is one location west of similar production.

Third zone to be completed was perforated at 5,930-6,043 ft. Potential was 320.26 bbl. of 35° oil a day through 18/64-in. choke.

No. 6-A TXL is approximately 2 miles southeast of Notrees townsite, in Section 21, Block 45, Township 1 South, T&P Survey.

Michigan dedicates oil-centennial marker

The Michigan oil industry has dedicated a Michigan Historical Commission historical marker as part of the state's observance of oil's 100th anniversary.

The marker was dedicated before the main grand stand at the opening of the Isabell County Centennial Fair and later will be permanently erected at a suitable park site along the proposed new routing of U.S. Highway 27 near Mount Pleasant, "The Oil Capital of Michigan."

Walter Russell of Mount Pleasant, veteran oil man representing the Isabella County Historical Society, presided at the ceremony. The dedication was made by William Palmer, executive secretary of the Oil and Gas Association of Michigan and the Associated Petroleum Industries of Michigan. Dr. George S. May, historic-sites specialist for the commission, represented his agency.

The marker notes that the first commercial oil production was found at Port Huron in 1886, that Michigan's first oil boom was at Saginaw, where production began in 1925. The drilling of about 300 wells in the Saginaw area before 1927 preceded the discovery of oil in the Muskegon area and the opening of the Mount Pleasant field in 1928 helped, as the marker notes, "to make Michigan one of the leading oil producers of eastern United States."

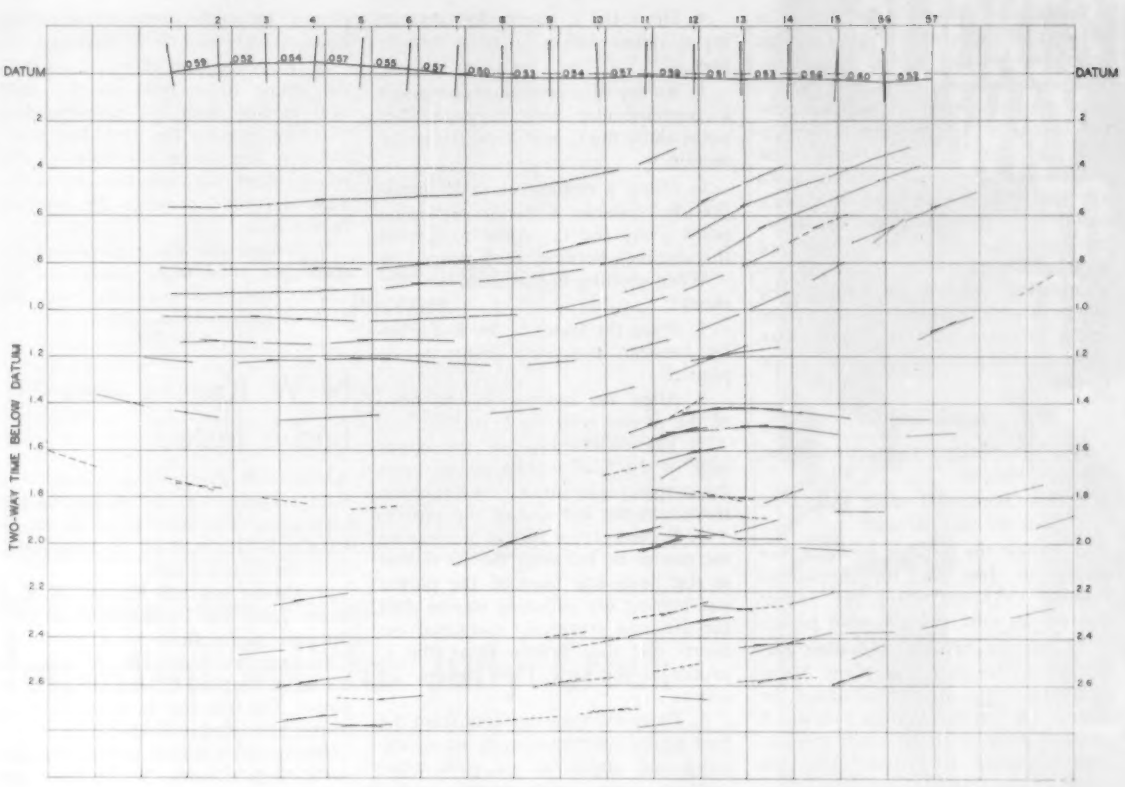
Lincoln County test under way in Oregon

Oregon Oil & Gas Co. has cemented surface casing in a wildcat located about 20 miles west of Albany in Lincoln County.

The test is slated to go to the Eocene expected at around 2,000 ft. Some gas shows were reported in a couple of wildcats drilled 2 miles to the southeast.

Drilling continues on East Kentucky well

In Carter County and located approximately 3 miles northeast of Olive Hill, United Fuel Gas Co. is drilling below 4,000 ft. at 1 Stamper, a rank wildcat for the area. Test is thought to be in the Knox dolomite and drilling will probably continue until basement rocks are reached.



Seismic cross-sections are quickly plotted . . .

A CROSS-SECTION plotting instrument which eliminates many of the time-consuming details in seismic computations connected with migrating dips in time has been developed. This seismic tool is the Gil-Har resolved time plotter devised and patented by Ohio Oil Co. geophysicists Fred Gillig and Charles Harwood of Tulsa. The chief advantage of this instrument is that it eliminates the task of constructing the two arcs to which a tangent, representing the migrated dip, must be drawn. This function is performed automatically as the instrument is operated. The theory behind the operation of this plotter was published in articles written by Dr. R. B. Rice, of Ohio's Denver Research center. This theory approaches the curve-ray method and is believed to be more accurate than the straight-line method of migrating depths.

The principal assumption of Dr. Rice's theory, on which the method is based, is that the ray paths as they appear on a time cross-section are straight lines and are normal to the reflection horizon on the time cross-section. This assumption makes it possible to resolve the original time data graphically.

A need for the resolved time plotter was realized after the method was put into practice by interpreting seismograph records recorded in steeply dipping areas.

The instrument is designed using a weighted head containing a gear-operated assembly. This slide assembly can be set by a scale to make spread distance adjustments. A screw lock keeps the sliding assembly in position. The arms and ruling index are made of aluminum and have a time scale engraved on each arm. The base of the plotter is constructed in the same manner as the head, except it is made of aluminum to reduce the weight.

Functions of the Plotter

Migration distances can be varied by the use of horizontal velocity found by plotting first breaks from seismic records. The horizontal scale of the plotted section is in true proportion to the vertical scale. This is a feature that a cross-section plotted in depth does not have. Cross-sections plotted in time do not have to be re-plotted

. . . with this time plotter

as additional velocity information is obtained. This permits a rapid change from one velocity curve to another. The instrument is ideal for foreign areas where subsurface velocity control is scarce. The instrument is portable and can be moved easily. The plotter can be quickly adjusted to any spread length and can be rapidly moved from one shot point to another on the cross-section since it is not clamped to the table. Strike-dip determinations can also be plotted. The plotter is readily adjusted to plot from center to center of two adjacent shot point spreads, or across one given spread.

Instructions

When preparing cross-section paper, the user should:

1. The horizontal scale should be two times the vertical scale.

2. Divide the distance between shot points in feet by the horizontal velocity (V_h) to obtain the proper distance in time between shot points.

3. Plot the two-way elevation correction (t_e) for each shot point. Negative values of t_e are plotted above the datum and positive values below. A negative t_e is indicated when the surface elevation is greater than the depth of shot plus datum.

4. Draw the t_e profile by connecting t_e values with a series of straight lines.

5. By use of a protractor, construct a perpendicular beneath each shot point along the t_e profile on the cross-section.

6. Using a centimeter scale, measure the distance between each shot point along the t_e profile and write this distance between each point.

When plotting in-line data, the user should:

1. Place the head of the R-T Plotter between two shot points to be plotted.

2. Align the hairline in the head of the plotter with the t_e profile.

3. The etched line on the upper edge of the head is then placed upon the perpendicular drawn on the cross-section to the left end of the profile.

4. Set the proper spread distance on the plotter by releasing the set screws at the head and base of the plotter and turning the adjusting screws until the distance previously measured between the shot points along the t_e profile is reached. Then tighten set screws.

5. Place the two-way time from the first record (corrected only for weathering and angularity of path when plotting across seismograms) in the plotter by sliding the ruling index down the left arm to the desired time.

6. Pivot the arms of the plotter until the ruling index rests on the right arm in line with the corresponding two-way time for the next shot point. Draw a line along the base of the ruling index between the two arms. This segment represents the resolved time profile.

7. Repeat the above procedure for each shot point to be plotted.

The plotter is available from the J. A. Blackwood Co., Tulsa.

N. W. Kansas area find is tested

ANOTHER discovery is indicated in Northwestern Kansas' Pennsylvanian play area. The new strike is Skelly Oil Co. 1 Meyer in SE SE NW 20-1s-32w, Rawlins County.

Swabbing got 108 bbl. of oil in 8 hours from the Lansing-Kansas City through perforations at 4,061-70 ft. The zone was acidized. Before acid the well swabbed 22 bbl. of oil in 9 hours. The operator is now swabbing at the hourly rate of 10 bbl.

Skelly has a dozen active locations in Rawlins County. Six of these are near Cahoj field. Skelly's activity in this area includes completion of the 1 Sramek in SE SE NE 18-1s-34w, 1 mile west of the field discovery well. It made 243 bbl. of oil daily.

The 1 Kisling in SE NE SE 9-1s-34w, got 3,400 ft. of clean oil on drill-stem test. Development of the field continues brisk to the northeast. The 1 Garver in NW SW NW 20-1s-34w is a dry hole.

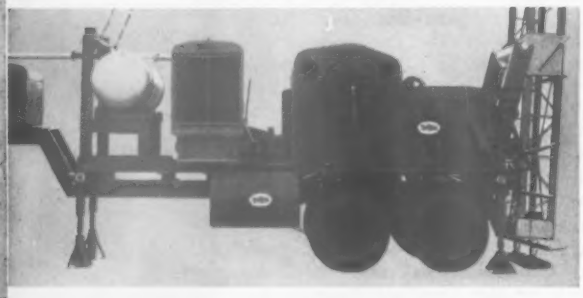
The only two dry holes in the field are on the southwest side. There is also drilling under way on the southeast side of the field.

Important Michigan find is tested

In Michigan, Lloyd C. Green 1 Reimink, NE NW NW 21-3n-14w, Allegan County, flowed net oil after 4 hours following sand fracture of Salina A-2 dolomite pay at 2,500-32 ft. For possible new horizon discovery in Heath Township. Location is 4 miles from the Overisel Salina gas field.

Bell and Gault 1 Bissell, SE SW NE 8-4s-2w, Jackson County wildcat, 7 miles east of Pulaski oil field, shut down for orders at 4,272 ft. in Black River lime without oil pay to present point. Test has gaged up to 17 M.M.c.f. gas in Trenton dolomite and triggered a big lease and royalty play.

9,000-FT. SERVICE UNIT ...8 FT. WIDE!



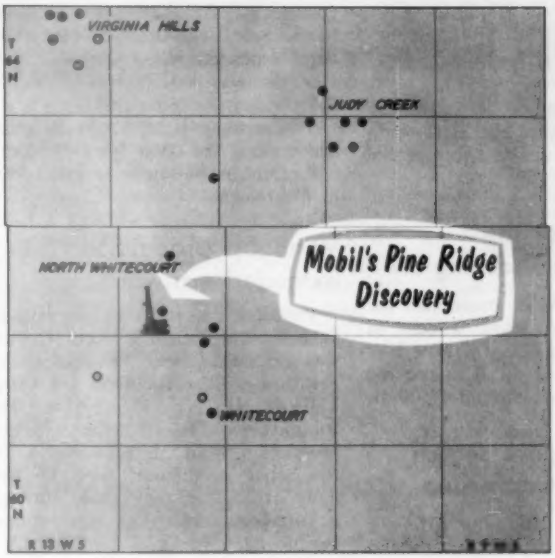
WICHTEX Model F-75-Heavy-Duty . . . truck or trailer mounted . . . is recommended to 9000 feet with an 87-foot or 65-foot fabricated telescoping derrick, or double telescoping 65′ x 7″ x 8″ mast, or double telescoping 87′ x 8″ x 10″ mast. Equipped with air friction clutches, air or hydraulic friction cathead, and winch mounted to raise mast. Write for specifications:

WICHTEX WELL SERVICING UNITS

WICHTEX MACHINERY COMPANY

P. O. Box 2250 WICHITA FALLS, TEXAS

Manufacturers of Wichtex Servicing Units (2,000′ to 12,000′ capacity) and Wichtex Portable Rotary Rigs (2,000′ to 5,000′ capacity).



ANOTHER Middle Devonian discovery in Alberta's Judy Creek area returns the drilling spotlight to this oil giant.

Near Alberta's North Whitecourt is an . . .

Important find for Judy Creek

ALBERTA'S famed Judy Creek area gained another significant oil discovery last week at a Mobil Oil of Canada, Ltd., wildcat 30 miles southwest of Swan Hills field and 16½ miles southeast of Virginia Hills.

The new strike is the 6-9-62-12 Pine Ridge on LSD 6, 9-62-12w5, 3 miles west of Mobil's 6-1 North Whitecourt discovery area. Production is from the Beaverhill Lake-Middle Devonian tapped at 8,369 ft. During drill-stem tests the well flowed gas at the daily rate of 5 M.M.c.f. This gas flow was accompanied by oil. Testing continues at this important link well between the North Whitecourt and Whitecourt areas.

Prolific gasser hits in Alberta

A GAS WELL with four times the open flow potential of any of the four previous wells drilled in Alberta's Dick Lake field has been announced by British-American Oil.

The new BA-CPR Atlas 7-15 well, 55 miles south of Edmonton in the south half of the Dick Lake field operated by BA, encountered a gross D3 pay section of 451 ft.

The 7,645-ft. well achieved an estimated absolute open-flow potential of approximately 1.2 billion cubic feet of gas per day following a series of productivity tests.

The highest flow rate obtained during the tests was 81 M.M.c.f.d. at a wellhead flowing pressure of 735 psi.

The BA-CPR Atlas 7-15 well was drilled as a joint venture by BA, California Standard, Phillips Petroleum and Husky Oil.

Well completed in Ohio's Wayne County

In Ohio Charles Kuhn completed his third and best producer on the Ada Todd tract in a development in Section 36, southeast Plain Township, Wayne County.

The Clinton was logged at 3,049-59 ft. and had a flow of 320 BOPD with 297 M.c.f. after fracture. The two previous completions had a rate of 25 to 30 BOPD respectively.

SLICKEST WAY TO TD

USED AND RECOMMENDED

. . . *especially* under conditions where DRAG, TORQUE, OR THE HAZARD OF STICKING DRILL-PIPE, LINER AND CASING are encountered.

SIX YEARS OF FIELD EXPERIENCE

have proved the effectiveness, versatility and trouble-free application of

SOUTHWESTERN FLAKE GRAPHITE

Available through your mud dealer.

92 SOUTHWESTERN GRAPHITE CO.

BURNET, TEXAS

California drilling roundup:

New pool find for Shiells Canyon

Texaco, Inc., completed a well on the west edge of the Shiells Canyon field in Ventura County, California, for what is being labeled a new pool discovery.

The Texaco test, 20 Elkins, was brought in flowing 304 bbl. daily of 32.1°-gravity crude, 8% cut, through a 40/64-in. choke. The perforations are in an Eocene formation at 5,982-6,597 ft. The well is located in NE SW 5-3n-19w. Texaco took the test to 14,206 ft. before plugging back for the new zone completion.

New field discovery credited for Vernalis

The Porter Sesnon-Great Basins Petroleum Co. group continued its record of successful gas drilling in the Vernalis field of San Joaquin County with a reported discovery 4 miles southwest of nearest production. The new well, 22-5 Sesnon-Vernalis, is separated from Vernalis production by a couple of dry holes. The test is perforated at 4,562-66 ft. in the top of the Ragged Valley silt. Early indications were it would be a commercial gas discovery.

Callam County site announced in Washington

Russell A. Cobb, Jr. pinpointed the site for his Pillar Point wildcat in Callam County as being in NW NW 4-31s-11w. It is scheduled to test the lower Blakely sands around 7,500 ft.

Humble continues search at San Juan Capistrano

Humble Oil & Refining Co. was continuing its drilling program around the San Juan Capistrano region in Orange County.

Officially labeled strat tests, the Humble drilling projects currently rank as the southern most drilling going on in the state.

Humble abandoned one such strat test at 5,126 ft. last week. This effort, c-3 O'Neill Estate, was located in SW SW 3-8s-7w, which was 3 miles east of the community of San Juan Capistrano. At another site virtually on the San Diego-Orange County border 5 miles below c-3 O'Neill Estate, Humble was drilling ahead below 7,450 ft. on a similar test.

This activity is all about 20 miles south along the coast from Newport, site of the most southerly production in California.

Windgap production extended eastward

Production in the Windgap area of Wheeler Ridge field in Kern County was extended about ¼ mile southeastward with a Richfield Oil Corp. well in NE NE 31-11n-19w. The Richfield well, 62-31 Tejon A, found production in an interval below 8,600 ft. Initial production was 27 bbl. daily of 55.1°-gravity crude through a 14/64-in. choke. Cut was running around 22%.

Wildcatters miss in California

A COUPLE of closely watched wildcats in Los Angeles County recently were abandoned by their respective operators. They included:

... **Castaic Siding.** Texaco, Inc. threw in the towel at 14,034 ft. on

AUTOMATION isn't learned from a book . . .

Avoid tying up your good engineers with the often-wasteful task of struggling with unfamiliar automation problems . . . or attempting to fit piecemeal components into a workable system. Instead, rely on Odex for completely-integrated production automation, PLANNED FOR PROFITS.

Only with Odex does one contract give you turnkey service—engineering, specs, and installation all subject to your approval. Your system will be tailored to lick your specific problems for quick payout . . . and backed by priceless experience in solving oilfield-profit problems through automation.

Remember, automation is our job—from simple LACT units to complex systems for gathering data, monitoring, and supervising entire fields from a distant point. If you're wondering whether you could profit from automation, get the right answer right away from Odex.

ODEX ENGINEERING COMPANY

1410 N. Grant/ODESSA, TEXAS/FEderal 7-3568

an extension test drilled about ½-mile southwest of its Honor Rancho production.

...South Los Angeles. Western Gulf Oil Co. plugged and abandoned an expensive deep test drilled in the southern part of metropolitan Los Angeles, specifically, in the Watts area. Western Gulf, who kept the test a strictly "no dope" hole all during its drilling, drilled a total of 20,630 ft. on the original hole and one redrill job on the wildcat. It was taken to 13,058 ft. initially, plugged back to 5,300 ft. and redrilled to 12,872 ft. before being abandoned.

Discovery wells

CALIFORNIA

Contra Costa County: Trico Oil & Gas Co. 3 Faria Unit, NE NW 21-2n-1w, dual zone completion, upper perfs. at 1,570-75 ft., 1,580-89 ft. and 1,644-49 ft. made 1,800 M.c.f.d., lower perfs. at 1,910-47 ft. made 1,200 M.c.f.d., TD 2,500 ft. (Two new pool discoveries in the Willow Pass field).

San Joaquin County: Brazos Oil & Gas Co. 2 Sunray-Brazos-Vistario M&T Inc., NE SE 15-4n-4e, 2,200 M.c.f.d., ¼-in. choke, perfs. 4,096-4,105 ft., TD 4,500 ft. (New pool discovery in the River Island gas field).

Solano County: G. E. Kadane & Sons 10-B Standard-Suisun Community, NW SW 31-4n-1w, 835 M.c.f.d., ⅜-in. choke, perfs. 654-65 ft., TD 6,621 ft. (Shallower gas-pool discovery in Suisun Bay gas field).

San Mateo County: Neaves Petroleum Development Co. 1 Neaves-Union-Burns, NW SE 21-7s-4w, 18 BOPD, 19° gravity, perfs. 1,375-1,450 ft., TD 1,450 ft. (New field discovery in La Honda area).

WESTERN CANADA

Alberta: Dome 16-26-85-14 Boundary Lake, LSD 16, 26-85-14w6. Boundary Lake oil well. TD 4,811 ft.

Saskatchewan: Mobil X10-20 Northeast Midway, LSD 10, 20-15-19w3. Shaunavon oil discovery. TD 3,567 ft.

Devon-Palmer-Renwar 5-9-4-8 Hitchcock, LSD 5, 5-9-8w2. Midale oil discovery. TD 5,147 ft.

COLORADO

Logan County: W. C. McBride-HLM Drilling Co. 1 Hawkins "A," SE NW 31-8n-53w. IPP 43 BOPD, "J" sand discovery, new field. TD 5,055 ft. "J" sand.

Garfield County: The California Co. 1 Baldy Creek Unit, NW SE 17-7s-90w. IP 900 M.c.f.d., Corcoran discovery, new field. TD 10,256 ft. Mancos.

Jackson County: Gulf Oil Corp. 1 Sudditth-Federal, NW SW 22-9n-78w. IPP 5 BOPD, 12 BWPD, Frontier and Muddy discovery, new field. TD 6,760 ft. Morrison.

ILLINOIS

Christian County: Schaefer Oil Co. 1 Florence Padgett, NE NW NE 7-14n-2w. IP 185 BOPD, 20 BWPD, Silurian 1,893-1,906 ft. TD 1,906 ft. Extends Mount Auburn field.

Clay County: Gulf Oil Corp. 1 C. E. Pearce, NE NE SE 6-2n-7e. IP 10 BOPD, 15 BWPD, Rosiclare 3,059-3,062 ft. TD 3,149 ft. New pay discovery.

Effingham County: Farrar Drilling Co. 4 Cora Webster, SW SW NE 34-6n-6e. IP 150 BOPD, 70 BWPD, Aux Vases 2,633-45 ft. TD 2,800 ft. New pay, the Aux Vases.

Montgomery County: Clyde Bassett 1 Turner, SW SE SE 33-10n-4w. IP 4 BOPD, Penn. 603-612 ft. TD 625 ft. Opens South Raymond pool.

Richland County: Pure Oil Co. 18 C. T. Montgomery "B," NW¼ 4-3s-9e. IP 81 BOPD, 4 BWPD, St. Louis 3,102-10 ft., 3,120-30 ft. TD 6,800 ft. Geological wildcat in Clay City Consolidated pool.

Alva C. Davis 1 John Weber, NW SE 30-5n-9e. IP 128 BOPD, 35 BWPD, Aux Vases 2,940-50 ft. TD 3,080 ft. Opens North Passport pool.

INDIANA

Gibson County: V. J. Wilson Petroleum, Inc. 1 Hurt-Richard-McClure Community, NW SE NE 7-2s-8w. IP 15 BOPD, 120 BWPD, Jackson 1,224-32 ft. TD 1,638 ft. Extends Columbia field.

KANSAS

Barton County: Nadel & Gussman 1 Eveligh "A," NE NE SW 1-18s-13w. IP 360 BOPD, 39.8°, Arbuckle 3,329-41 ft. TD 3,341 ft. Opens Southwest Red Wing field.

Ellis County: Woodman-Iannitti 1 Richmond, SE NW SE 10-11s-17w. IP 72 BOPD, Arbuckle 3,379-85 ft. TD 3,385 ft.

Graham County: Peel-Hardman 1 C. Lindenman, SE SE SE 31-6s-25w. IP 340 BOPD, 38°, Lansing-Kansas City 3,841-45 ft. TD 3,845 ft. Opens Lindenman field.

Grant County: Hugoton Production Co. 2 Nafziger, C SW NE 3-29s-37w. IP 2,184 M.c.f.d., Council Grove 2,683-85 ft., 2,697-2,700 ft., 2,710-16 ft., 2,750-58 ft. TD 5,850 ft. Deep discovery inside Hugoton field.

Greenwood County: UHL & Wisdam et al. 1 Boles, NE NE NE 16-22s-12e. IP 20 BOPD, 50 BWPD, Bartlesville 1,784-1,814 ft.

Ellis County: Petroleum, Inc. 1 Zimmerman "G," NW SE SW 23-13s-20w. IP 350 BOPD, 38.8°, Lansing-Kansas City 3,478-82 ft. TD 3,894 ft. Zimm field discovery.

Meade County: Shamrock Oil & Gas Corp. 1 Edward H. Boyer, NW NW SE 5-33s-28w. IPF 10,100 M.c.f.d., 79 BOPD, Morrow 5,544-46 ft., 5,555-56 ft., 5,570-86 ft. TD 5,650 ft. New field.

Osborne County: Rudy Herman 1 Worley, NE SE SE 33-10s-15w. IP 20 BOPD, Conglomerate 3,409-14 ft., 36°. TD 3,414 ft. New pay discovery.

Pratt County: Gardner & Dunne 1 Henderson, SE SE SE 4-26s-14w. IP 41 BOPD, 35% bw., 32°, Lansing-Kansas City 3,945-47 ft. TD 4,489 ft. Opens Moore pool.

Riley County: Cities Service Oil Co. 1 Yaege, NE SW SE 25-11s-8e. IP 36 BOPD, 33.9°, Hunton 1,684-96 ft. TD 1,696 ft. Opens Yaege field.

Sedgwick County: Ernst Development Co. 1 Miller, SW SW NE 33-25s-2e. IP 180 BOPD, 38°, Burgess sand 2,917-21 ft. TD 2,927 ft. Opens South Ulmer field.

Stafford County: Petroleum, Inc. 1 Keeley "B," NE NE SW 5-21s-14w. IP 80 BOPD, 2% bw., 26.9°, Lansing-Kansas City, 3,525-30 ft. TD 3,625 ft. Opens Keely field.

Duke Drilling Co. 1 Hall, C W½ SE NE 12-21s-12w. IP 25 BOPD, 9 BWPD, 44.4°, Arbuckle 3,459-64 ft. TD 3,500 ft. Extends San Dago field.

R. W. Shields 1 Stargel, NE NE SE 17-22s-12w. IP 50 BOPD, Arbuckle 3,691-95 ft. TD 3,605 ft.

Wilkinson Drilling Co. 1 Praeger, SW SW SE 36-24s-15w. IP 182 BOPD, 35°, Arbuckle 4,396-4,400 ft. TD 4,400 ft. Opens Praeger field.

D. R. Lauck & Sunray 1 Frank, SW SW SW 27-25s-15w. IP 16 M.M.c.f.d., Cherokee 4,254-68 ft. TD 4,603 ft. Opens Southwest Haynes field.

Stanton County: Western Natural Gas Co. 1 Harry G. Armstrong, C NW SE 24-30s-41w. Shut in gas discovery. Completed as Permian and Morrow discovery.

Sumner County: Shawver-Armour 1 Costin, SE SW SE 8-30s-1e. IP 127 BOPD, 48.5°, Simpson 3,786-90 ft. TD 3,790 ft.

1 Clark, SE NE SE 2-31s-3w. IP 233 BOPD, 1% bw., 38°, Lansing-Kansas City 3,312-14 ft. TD 3,907 ft. Opens Northwest Moyer field.

Lario Oil & Gas Co. 1 Ashton, C NE NW 19-32s-1e. IP 45 BOPD, 42.8°, Simpson sand 4,056-69 ft. Opens Interchange field.

KENTUCKY

9-1-28: Hupp Oil Co. 1 Brooks Van Diver, IP 10 BOPD, Tar Springs 1,092-1,106 ft. TD 1,106 ft. Extends Livermore pool.

NORTH LOUISIANA

Tensas Parish: Riverside Oil Co. 1 Lucille Hopkins, 33-10n-11e, IP 53,000 M.c.f.d., estimated open flow, GLR 14.5 M.c.f. per barrel, 59.6°, RP 3,012 psi., perf. 9,012-24 ft., Tuscaloosa Pilot sand. TD 9,150 ft. Extension and new pay for Chamblee field.

Jeff Davis Parish: Aluminum Co. of America 1 Hazel Daigle et al. 11-8s-5w, 2 miles southwest of Edna field. IP 330 BOPD, 1,900 M.c.f.d., 10/64-in., 43°, TP 4,300 psi., perf. 9,958-62 ft., and 202 BOPD, 3,100 M.c.f.d., 10.64-in., 45.2°, 4,100 psi., perf. 9,703-07 ft. TD 11,270 ft. New-field discovery.

SOUTH LOUISIANA

St. Mary Parish: Union Oil & Gas Corp. of Louisiana 2 State Lease 2,682. Twp. 16s-8e, in East Cote Blanche Bay. IP 1,316 M.c.f.d. and 33 BOPD, 10/64-in., TP 4,800 psi., perf. 12,970-76 ft. TD 16,452 ft. Second well and new pay in East Lake Sand field.

MICHIGAN

Calhoun County: Otterbine, Donley and McClure No. 1, C SE SE 12-1s-5w. IP 200 M.c.f.d., Niagaran 3,184-3,228 ft. TD 4,403 ft. Lee pool discovery.

MISSISSIPPI

Pike County: J. Willis Hughes and Sun Oil Co. 1 Pope et al. Unit, 10-3n-7e. IP 244 BOPD, 9/64-in., 42.5°, TP 1,625 psi., GOR 1,360 cu. ft. per barrel, perf. 10,882-86 ft., Tuscaloosa. TD 11,238 ft. Elev. 384 ft., Lower Tuscaloosa 10,790 ft. New field—McComb.

EASTERN NEBRASKA

Hitchcock County: Skelly Oil Co. 1 J. M. Reiher, C NE NE 28-1n-32w. IP 348 BOPD, 35°, Lansing-Kansas City 3,816-3,920 ft. Opens Reiher field.

TEXAS GULF COAST

Colorado County: J. F. Corley 1 J. W. Zwiegel, Lot 22, F. Secrest Sur., A-670, 5 miles south of Columbus. Shut-in gas

July footage review for U. S.

	FIELD WELLS					WILDCAT WELLS			
	Oil	Cond.	Gas	Dry	Service	Oil	Cond.	Gas	Dry
Alabama	69,532	.....	.....	.....	.....	.....	.....	.....	34,719
Arizona	.....	.....	.....	.....	.....	.....	.....	.....	6,423
Arkansas	111,858	.....	26,360	93,164	.....	9,798	.....	11,309	57,596
California	303,647	.....	12,879	80,095	39,132	28,116	.....	5,067	178,604
Colorado	55,282	.....	26,005	71,528	4,923	14,614	.....	.....	210,926
Illinois	210,915	.....	.....	164,948	68,527	21,307	.....	.....	59,952
Indiana	38,547	.....	867	49,370	.....	3,255	.....	.....	29,354
Iowa	.....	.....	.....	.....	.....	.....	.....	.....	2,236
Kansas	462,374	.....	70,500	321,321	36,208	27,032	5,650	39,632	318,777
Kentucky	52,872	.....	45,989	53,509	1,954	2,397	.....	1,312	46,738
Louisiana	1,000,416	443,944	104,924	634,452	4,720	22,568	46,610	10,310	446,009
North	165,385	.....	55,224	104,025	.....	7,558	.....	10,310	105,899
South	625,297	377,815	10,310	406,205	4,720	15,010	33,170	.....	314,950
Offshore	209,734	66,129	39,390	124,222	.....	.....	13,440	.....	25,160
Michigan	55,132	.....	.....	87,060	21,515	6,847	.....	.....	34,302
Missouri	.....	.....	.....	.....	.....	.....	.....	.....	2,790
Mississippi	204,146	30,870	.....	85,376	.....	.....	.....	.....	213,056
Montana	79,224	.....	5,844	29,754	.....	.....	.....	.....	23,176
Nebraska	208,381	.....	.....	179,487	.....	29,775	.....	.....	165,204
New Mexico	457,165	13,022	115,731	79,119	.....	15,563	.....	.....	93,369
West	91,030	13,022	111,781	11,267	.....	918	.....	.....	7,596
East	366,135	.....	3,950	67,852	.....	14,645	.....	.....	85,773
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	5,919
New York	15,252	.....	2,373	.....	9,320	.....	.....	.....	9,115
North Dakota	168,192	.....	.....	43,932	.....	22,285	.....	.....	47,855
Ohio	158,042	.....	44,164	90,120	30,097	4,121	.....	.....	8,919
Oklahoma	1,047,892	70,203	219,427	402,586	11,424	38,464	17,238	38,822	214,592
Pennsylvania	21,704	.....	57,757	21,683	15,902	.....	.....	.....	11,109
South Dakota	.....	.....	.....	.....	.....	8,380	.....	.....	.....
Tennessee	.....	.....	.....	1,289	.....	.....	.....	.....	1,732
Texas	3,766,669	362,809	270,339	1,231,912	101,917	124,829	72,813	7,315	1,537,402
Dist. 1	82,247	7,796	7,727	48,808	.....	8,677	.....	3,600	77,550
Dist. 2	80,018	53,587	62,122	103,275	.....	6,510	.....	.....	169,526
Dist. 3	352,687	119,951	18,975	150,583	.....	8,637	31,662	.....	188,659
Dist. 4	176,127	58,806	49,530	151,168	4,720	.....	25,772	.....	159,142
East	319,837	38,475	.....	90,855	.....	1,161	8,000	.....	85,759
Dist. 7-B	289,010	8,438	10,131	186,312	4,433	19,337	.....	3,715	192,531
West	1,761,887	10,590	11,013	256,494	25,493	51,626	.....	.....	469,419
Dist. 9	403,930	.....	67,308	202,379	67,271	28,881	.....	.....	152,170
Dist. 10	300,926	65,166	43,533	42,038	.....	.....	7,379	.....	42,646
Utah	70,291	.....	.....	13,057	.....	5,884	.....	.....	6,107
West Virginia	18,497	.....	88,636	27,416	.....	.....	.....	16,682	.....
Wyoming	178,225	.....	42,533	75,123	16,512	22,673	.....	8,110	199,035
Total July	8,754,255	920,848	1,134,328	3,836,301	362,151	407,908	142,311	138,559	3,965,016
Western Canada	672,221	.....	116,285	104,406	.....	24,507	.....	49,977	167,041
Alberta	492,614	.....	101,130	76,853	.....	24,507	.....	41,594	103,309
Saskatchewan	173,230	.....	4,579	25,573	.....	.....	.....	1,583	63,732
British Columbia	.....	.....	10,576	.....	.....	.....	.....	6,800	.....
Manitoba	6,377	.....	.....	1,980	.....	.....	.....	.....	.....

well, no gas, perf. 2,754-57 ft., Frio. TD 6,012 ft. New field.

Lavaca County: Sun Oil Co. 1-A O. R. Borchers, James Chesher Sur., A-113, 17 miles northwest of Edna. AOF 43 M.M.c.f.d., dry gas, shut-in TP 1,637 psi., perf. 3,954-57 ft., and 66 M.M. c.f.d., dry gas, shut-in pressure 1,115 psi., perf. 2,845-48 ft. TD 6,305 ft. New-field discovery.

Live Oak County: Atlantic Refining Co. 6 Sanger Heirs, Sec. 386, J. T. Conn Sur., 16 miles southwest of George West. IP 1,380 M.c.f.d., GLR 94 M.c.f. per barrel, 52°, shut-in TP 2,525 psi., perf. 7,418-26 ft., Wilcox, and 3,060 M.c.f.d., GLR 81.7 M.c.f. per barrel, 56.3°, shut-in pressure 2,400 psi., perf. 7,322-45 ft., Wilcox. TD 7,800 ft. New-field discovery.

Matagorda County: Magnolia Petroleum Co. 1 R. B. Trull, Sec. 39, Texas Rice Development Co. Subd., Susan Perkins Sur., 5 miles northwest of Palacios. IP 12,500 M.c.f.d., calculated open flow, GLR 32.3 M.c.f. per barrel, 52.2°, shut in pressure 3,384 psi., perf. 9,098-9,111 ft., Lower Melbourne, and 255.04 BOPD, 10/64-in., 40°, GOR 553 cu. ft. per barrel, pressure 900 psi., perf. 8,155-63 ft., Frio. TD 11,994 ft. New-field discovery—2 miles northwest of one-well Bruce Flo field.

Refugio County: W. M. Averill, Jr., et al. 4 R. D. Rooke Estate, Blk. 23, La Rosa Ranch Subd. "C," Jose Miguel and Maria Aldrete Grant, 7 miles south of Woodsboro, IP 55 BOPD, 8/64-in., 39.4°, GOR 880 cu. ft. per barrel, TP 490 psi., perf. 5,907-08 ft., Frio. TD 6,600 ft. New pay in Hog Lake field.

WEST TEXAS

Gaines County: Nearburg & Ingram 1 Riley, Sec. 107, Blk. H, D&W Sur., 14 miles northeast of Seminole. IP 3,600 M.c.f.d., Yates 3,226-3,330 ft. TD 3,330 ft.

Shell Oil Co. 1 Mrs. Viola Bain, Sec. 280, Blk. G, WTRR Sur., 8 miles northwest of Seminole. IPP 58 BOPD, 31°, Devonian 11,755-61 ft. TD 11,814 ft. Elevation 3,473 ft.

Garza County: U. S. Smelting, Refining & Mining Co. 1 Lora N. Sims, Sec. 7, Blk. 2, T&NO Sur., 9 miles southwest of Justiceburg. IPP 218 BOPD, 37°, GOR 203:1, Ellenburger 8,264-77 ft. TD 8,278 ft., elevation 2,460 ft.

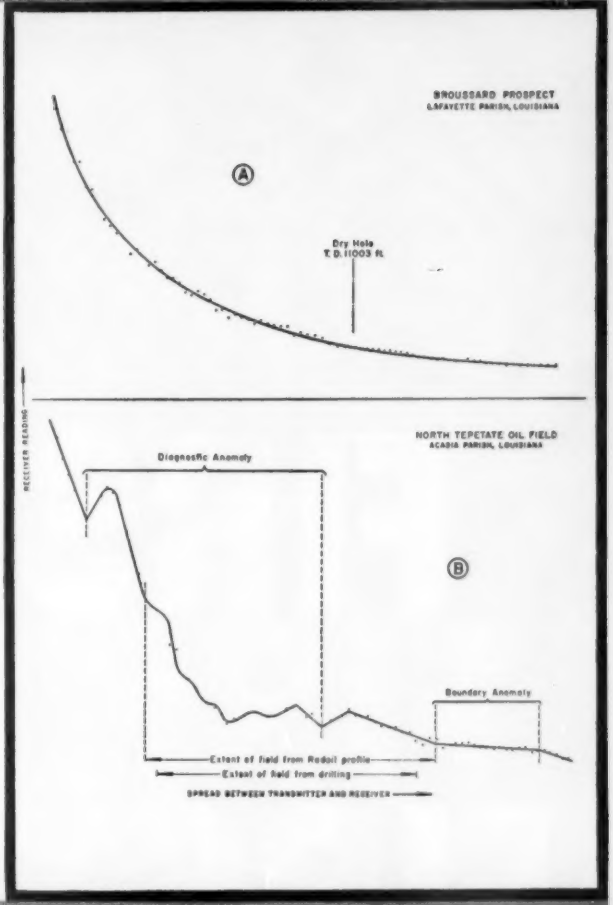
Southern Minerals Corp. 1 J. B. Slaughter, Sec. 6, Blk. 2, T&NO Sur., 8 miles southwest of Justiceburg. IPP 126.5 BOPD, 40°, GOR 693:1, Strawn 7,820-26 ft. TD 8,275 ft., elevation 2,360 ft.

Mitchell County: M. R. Voltz 1 J. D. Barber, Sec. 18, Blk. 28, T1S, T&P Sur.,

Cold Facts for Exploration Men

ALMOST 400 RADOIL SURVEYS, INVOLVING MORE THAN 43,000 MILES OF PROFILE, HAVE PROVED THAT:*

- When relatively smooth, ***neutral*** profiles are observed over a wildcat or development well site, there will be little chance of completing a commercial oil or condensate well at the location checked. Illustrative of this is the neutral profile at (A), which was secured for a major oil company, and which correctly condemned in advance of drilling a well-known Gulf Coast prospect.
- When *anomalous* profiles, displaying *diagnostic* and *boundary* anomalies of good quality, are observed over a wildcat or development well site, there will be an excellent chance of completing a commercial oil or condensate well at the location checked. For example, see the anomalous profile at (B) —also obtained for a major company—which was observed shortly after the completion of the discovery well, at a depth of 7,950 feet, of an important Gulf Coast oil field. Note that the limits of the field, as indicated by the profile, are in good agreement with those established by subsequent drilling.



Radoil surveys are available alike to independent operators and major companies. They offer a prompt and relatively inexpensive means of evaluating the oil-producing possibilities of structural, stratigraphic, and lithologic prospects before drilling. Full information on request.

NOW AVAILABLE TO THE OIL INDUSTRY SOLELY THROUGH

WILLIAM M. BARRET, INC.

Founded in 1927

CONSULTING GEOPHYSICISTS

Offices • Laboratories • Shops, Linwood at Dalzell
SHREVEPORT, LOUISIANA

*TM & SM Reg. U. S. Pat. Off.

No. 2 in a series

REED
FIRST in the field . . .
FIRST in experience . . .
FIRST with tool joints
for light weight drill pipe!

Reed was designing and making tool joints for light weight pipe as early as 1948.

Reed Wide Open tool joints have been *proved* in the field on more than two million feet of drill pipe. Some light weight strings with Reed Wide Open joints have made more than 300,000 feet of hole.

Naturally you want the best tool joints made for your light weight drill pipe. The answer is Reed-designed Wide Open tool joints — tested and proved in the field, interchangeable in most sizes with API internal flush working connections, with an I.D. that matches the I.D. of light weight drill pipe.

Only Reed offers a tool joint that is right for every drilling need. When you buy tool joints, buy Reed!

The Reed end seal is stronger in torsion than the pipe body. The mating end seal design assures positive shoulder seal contact . . . no threads to interfere.

REED

SUPER SHRINK-GRIP AND FLASH WELDED

TOOL JOINTS

REED ROLLER BIT COMPANY

Houston 1, Texas

EXPORT OFFICE: 1011 INTERNATIONAL BLDG., NEW YORK 20, N. Y.

GULF COAST, MID-CONTINENT, ROCKY MOUNTAIN AND CANADIAN DISTRIBUTOR FOR MARTIN-DECKER PRODUCTS

REED'S ROLLIN'

The Image of CF&I *assures top quality in*

Seamless Casing and Tubing

The CF&I giant stands for skill and long years of experience in producing quality steel products. And in the petroleum industry, users have learned to rely on CF&I's craftsmanship for straight, strong and "true" seamless casing and tubing.

CF&I's advanced production equipment and techniques—from special heat treatment to precision threading, plus a system of meticulous inspections—is your guarantee of quality casing and tubing. Made from top quality steel, CF&I Seamless Casing and Tubing are subjected to rigid manufacturing standards and meet API STD 5A specifications. They are available in sizes 2⅜" through 9⅝" O.D.

The next time you need seamless tubing or casing, we suggest that you get in touch with the nearest CF&I sales office. We'll be happy to quote on your requirements.

CF&I STEEL **SEAMLESS** *casing and tubing*

6622-A

THE COLORADO FUEL AND IRON CORPORATION • DENVER, COLORADO

The July completion score for the U. S.

	TOTAL COMPLETIONS							WILDCAT WELLS							
	Total	Crude	Cond.	Gas	Dry	Service	Footage	Total	Crude	Cond.	Gas	Dry	Footage	C.T.	Act. op.
Alabama	10	6	0	0	4	0	104,251	4	0	0	0	4	34,719	0	9
Arizona	1	0	0	0	1	0	6,423	1	0	0	0	1	6,423	0	12
Arkansas	90	40	0	9	41	0	310,085	22	3	0	3	16	78,703	0	107
California	134	69	0	4	52	9	647,540	38	3	0	1	34	211,787	0	174
Colorado	74	13	0	5	55	1	383,278	45	3	0	0	42	225,540	0	132
Illinois	238	98	0	0	104	36	525,649	38	8	0	0	30	81,259	22	386
Indiana	81	27	0	1	53	0	121,393	26	2	0	0	24	32,609	70	82
Iowa	1	0	0	0	1	0	2,236	1	0	0	0	1	2,236	0	0
Kansas	351	148	1	21	170	11	1,281,494	97	7	1	7	82	391,091	9	447
Kentucky	178	72	0	17	83	6	204,771	40	2	0	1	37	50,447	155	237
Louisiana	352	153	39	24	134	2	2,713,953	56	3	3	1	49	525,497	0	436
North	127	60	0	19	48	0	448,401	22	2	0	1	19	123,767	0	136
South	180	73	33	1	71	2	1,787,477	31	1	2	0	28	363,130	0	240
Offshore	45	20	6	4	15	0	478,075	3	0	1	0	2	38,600	0	60
Michigan	65	27	0	0	25	13	204,856	20	2	0	0	18	41,149	16	175
Mississippi	55	19	3	0	33	0	533,448	24	0	0	0	24	213,056	0	69
Missouri	1	0	0	0	1	0	2,790	1	0	0	0	1	2,790	1	1
Montana	32	17	0	1	14	0	137,998	5	0	0	0	5	23,176	3	71
Nebraska	97	41	0	0	56	0	582,847	32	5	0	0	27	194,979	0	50
Nevada	1	0	0	0	1	0	5,919	1	0	0	0	1	5,919	0	0
New Mexico	195	129	2	26	38	0	773,969	24	3	0	0	21	108,932	51	255
West	82	46	2	25	9	0	235,614	6	1	0	0	5	8,514	14	151
East	113	83	0	1	29	0	538,355	18	2	0	0	16	100,418	37	104
New York	23	12	0	1	3	7	36,060	3	0	0	0	3	9,115	23	14
North Dakota	43	27	0	0	16	0	282,264	10	3	0	0	7	70,140	0	51
Ohio	121	56	0	19	36	10	335,463	3	1	0	0	2	13,040	121	191
Oklahoma	513	288	12	43	164	6	2,060,648	59	5	2	7	45	309,116	83	662
Pennsylvania	37	8	0	16	6	7	128,155	2	0	0	0	2	11,109	35	27
South Dakota	1	1	0	0	0	0	8,380	1	1	0	0	0	8,380	0	6
Tennessee	4	0	0	0	4	0	3,021	2	0	0	0	2	1,732	4	3
Texas	1,839	1,018	52	66	660	43	7,476,005	363	25	8	2	328	1,742,359	80	1,146
Dist. 1	106	45	1	4	56	0	236,405	32	1	0	1	30	89,827	0	49
Dist. 2	76	16	7	12	41	0	475,038	24	1	0	0	23	176,036	0	63
Dist. 3	135	67	15	3	50	0	871,154	24	1	3	0	20	228,958	0	85
Dist. 4	120	39	11	11	58	1	625,265	28	0	3	0	25	184,914	4	106
East	162	116	6	0	40	0	544,087	23	1	1	0	21	94,920	1	52
Dist. 7-B	249	111	2	4	127	5	713,907	66	6	0	1	59	215,583	0	100
West	534	366	1	4	154	9	2,586,522	109	8	0	0	101	521,045	28	472
Dist. 9	346	186	0	13	119	28	921,939	49	7	0	0	42	181,051	47	101
Dist. 10	111	72	9	15	15	0	501,688	8	0	1	0	7	50,025	0	118
Utah	17	14	0	0	3	0	95,339	2	1	0	0	1	11,991	0	54
West Virginia	62	8	0	44	10	0	151,231	4	0	0	4	0	16,682	58	198
Wyoming	112	47	0	7	51	7	542,211	39	5	0	1	33	229,818	8	158
Total July 1959	4,728	2,338	109	304	1,819	158	19,661,677	963	82	14	27	840	4,653,794	739	5,153
Total June 1959	4,335	2,272	96	297	1,581	89	17,014,601	751	66	10	19	656	3,802,262	1,008	5,674
Cumulative 1959	29,095	14,737	711	2,077	10,791	779	120,250,386	5,480	532	77	162	4,709	26,933,798	5,225	....
Cumulative 1958	27,404	13,535	664	2,070	10,456	679	114,634,117	5,447	546	90	164	4,647	25,599,912	....	....

. . . and in Canada

	TOTAL WELLS							WILDCATS					
	Total	Oil	Gas	Dry	Service	Footage	Cum. 1959	Total	Oil	Gas	Dry	Footage	Cum. 1959
Western Canada	246	135	40	71	0	1,134,437	1,462	62	4	10	48	241,525	430
Alberta	165	91	34	40	0	840,007	871	36	3	8	24	169,410	233
Saskatchewan	74	41	3	30	0	268,697	510	25	0	1	24	65,315	145
Manitoba	4	3	0	1	0	8,357	23	0	0	0	0	0	5
British Columbia	3	0	3	0	0	17,376	54	1	0	1	0	6,800	43
N.W.T.	0	0	0	0	0	0	4	0	0	0	0	0	4
Ontario	36	6	10	18	2	41,748	138	..	..	..	..	..	..

4 miles southwest of Westbrook. IPP 88 BOPD, 27°, GOR 400:1, Clear Fork 2,988-3,182 ft. TD 3,755 ft. Recompletion.

Runnels County: Karl Hoblitzelle 1-A Lucius Evans, Wallace Brandt Sur. 12, A-755, 3 miles southeast of Norton. IPP 138 BOPD, 49°, GOR 350:1, Goen lime 4,321-25 ft. TD 4,861 ft., ground elevation 1,838 ft.

WEST CENTRAL TEXAS

Jones County: Ken-Mor Drilling Co. and W. A. Fitzhugh 1 Mineral Wells Investment Co., Sec. 52, Blk. 18, T&P Sur., 15 miles southwest of Anson. IPP 25 BOPD, 38°, pay 3,148 ft. TD 3,152 ft.

Shackelford County: Grady Whitehead, Jr. 1 Pattie L. Smith, Sec. 69, Blk. 11, T&P Sur., 5 miles south of Albany. IP 130 BOPD, 10/64-in. choke, 42°, GOR 425:1, CP 690 psi., Mississippian 4,384-94 ft.; IP 112 BOPD, 10/64-in. choke, 43°, GOR 300:1, CP 610 psi., Ellenburger 4,426-36 ft. TD 4,458 ft., elevation 1,455 ft.

Stephens County: G. W. Ewing 1-C Alice Walker, Sec. 1323, TE&L Sur., 4 miles south of Ivan. IP 1,800 M.c.f.d., Marble Falls 3,876-96 ft. TD 4,397 ft.

Oil & Gas Incomes, Inc. 1-A Barker, Sec. 7, HT&B Sur., (Sec. 2, Blk. 8, T&P Sur. on some maps) 1 mile west of Breckenridge IP 45 BOPD, 20/64-in. choke, 36°, GOR 500:1, TP 1,000 psi., Caddo 3,226-30 ft.; IPP 61 BOPD, 38°, GOR 350:1, conglomerate 3,964-72 ft. TD 4,103 ft.

UTAH

San Juan County: Superior Oil Co. 41-15 Navajo "L," NE NE 15-42s-26e. IPP 22 BOPD, Paradox discovery, new field. TD 6,200 ft. Chimney Rock.

GLENN F. BISH
. . . keeps family name on Ohio Oil roster.

Bish Name Tied to Ohio Oil

. . . almost since the company was formed 72 years ago.

The current Bish is the new chief of domestic production.

THERE'S been a Bish with Ohio Oil Co. since before the turn of the century. And the company expects to have a Bish around for years to come.

The name of Bish has been associated with Ohio Oil for 68 years. The late James N. Bish joined the company in 1891—only 4 years after it was incorporated. He was with Ohio Oil for 46 years before his retirement as production superintendent in Haynesville, La., in 1937.

Carrying on the family tradition with Ohio Oil is James Bish's son, Glenn F. Bish.

Glenn Bish was 20 when he joined Ohio Oil in Haynesville in 1924. Fresh out of the University of Texas, he started out as a roustabout. Since then his rise has been marked by steady advancement, gaining wide experience in exploration and production along the way.

He recently reached another milestone in his lifelong association with Ohio Oil—appointment as vice president and manager of the company's domestic production.

In keeping with his new position, Bish sees the future of United States oil as "unlimited"—with oil frontiers that are yet to be explored. In a day when so many of the oil headlines are being made by foreign discoveries, he contends that the backbone of the oil business still lies in domestic production and will for a long time to come.

He sees this promise in three basic fields: New production in established oil areas, production in as yet unexplored regions, and technical advances and more efficient methods.

Background . . . Bish's credentials for expressing an expert opinion are impressive.

After starting out at Haynesville as a roustabout, he moved to Artesia, N. M., as a roustabout and clerk. He was a warehouseman for a few months in Columbine, Wyo., and then moved back to Artesia as a scout.

With 3 years of sharpening his smell for oil he went to nearby Hobbs as production foreman of the district. Five years later he was made district superintendent in charge of exploration and production.

Leaving Hobbs, he became division superintendent in Houston in 1940 and moved the next year to Ohio Oil's Mt. Pleasant, Mich., division in the same capacity. He was made assistant division manager there in 1942, and when the division moved to Grand Rapids, he was advanced to manager.

Appointed division manager in Tulsa in 1946, Bish at last was able to settle down with his wife, Eunice, and their three children. While in Tulsa, he became active in the affairs of the Oil Capital. He was president, vice president, and director of the Tulsa YMCA, president of Holland Hall School, president of the Tulsa Club, and was on the board of the area Boy Scouts.

Eight years later the call came from Ohio Oil's head office and Bish headed back to his native state as assistant manager of domestic production.

▶▶▶ Personals

George T. Atkins, formerly with Humble Oil & Refining Co., has joined Foster Wheeler Corp. as petroleum refining and petrochemical processing consultant. He will headquarter in Baytown, Tex.

Seven companies, including Slick Secondary Recovery Corp. and April Corp., have consolidated to form the Texstar Corp., San Antonio. **Charles S. Payson,** chairman of Vitro Corp. of America and a director of Armco Steel Corp., will be chairman of Texstar. **Tom Slick** will be executive committee chairman. **Dr. Robert V. West, Jr.,** will be vice president and head of the oil division.

Thomas A. Baldwin, Monterey Oil Co., and **John C. Hazzard,** Union Oil Co., have been nominated for 1960 president of the Pacific section of American Association of Petroleum Geologists. Other nominees are, for vice president, **Orville F. Bandy,** University of Southern California, and **George H. Feister,** Union Oil Co.; secretary, **Gordon R. Bell,** Western Gulf Oil Co., and **Robert J. Hindle,** Sunray Mid-Continent Oil Co.; and treasurer, **Richard B. Haines,** Continental Oil Co., and **Quentin M. Moore,** General Petroleum Corp.

Donald A. Monro, director of purchases for Standard Oil Co. (Ind.), has been appointed administrator of Ste. Civile Amoco, Indiana Standard's foreign market planning office in Paris. Monro succeeds **Joseph K. Roberts,** who will retire early next

In 1958 he took 3 months off from his domestic duties to become acting resident manager of the subsidiary Oasis Oil Co. of Libya. During this time Oasis made the first significant oil strike in the North African nation's history.

Bish was elected a director at Ohio Oil's annual meeting this year, a few days after he was made vice president.

His views . . . In describing the future of U. S. oil as "unlimited," Bish points out that though a quarter of the nation's land area is under lease, only about 5% of the leases are productive.

"This leaves a terrific amount of land that either hasn't been explored or needs to be explored again," he says. "New breakthroughs in research and in perfecting the tools we have now are going to open up a lot of these areas.

"Young geologists and engineers coming up now are getting a better education and have more tools to work with than when I was in their shoes. That's why I think that the future of oil is unlimited."

Bish tempers his optimism with caution: "We can meet the energy requirements of the country only as long as we remain free to compete and are not weighted down with unnecessary governmental encroachments, such as the restrictions on the production of natural gas. Elimination or reduction of percentage depletion could also raise havoc with the search for oil and gas."

"The future looks good, though, even with the risks we must take," he adds. "We can't be too afraid of drilling dry holes. We have to accept them as a part of our business.

"It's going to take a lot of vision and aggressiveness—and dry holes, too—to uncover new reserves. But that's what the oil industry has plenty of. They will be discovered."

---

year. **Charles F. Smith,** manager of the planning division of the manufacturing department in Chicago, will succeed Monro. **Ford H. Blunck,** manager of unit operations division in the Chicago general office and former general superintendent of the Wood River, Ill., refinery, will succeed Smith. Monro has been with Indiana Standard since 1923. He is a former chief engineer of the Whiting, Ind., refinery and was chief engineer in the manufacturing department at one time. Roberts joined the company in 1928. Before heading the Paris operations, he was general manager of research and development and a vice president.

Curtis J. Little has been named district geologist in the new Amarillo, Tex., office of Monsanto Chemical Co.'s Lion Oil division. **Shelton H. Goodwin, Jr.,** will be district landman, **Harold J. Trepagnier,** senior geologist, and **Guy D. Irwin** and **Don Paterson,** geologists, in the new office.

H. F. Koetsier, formerly exploitation engineer with Shell Oil Co. of Canada, Ltd., has joined Joe Phillips, Ltd., Calgary, as exploitation engineer. Koetsier was with Aramco Overseas Co. before joining Shell of Canada in 1957.

E. E. Tisdale, Robert Evans, and **C. K. Ferns,** geologists with Cities Service Oil Co. in Billings, Mont., have been transferred to Bartlesville, Okla. **C. E. (Tex) Hartman,** geologist, has been transferred to Lawrence, Kans., from the Billings office, which has been closed.

J. A. Ash, treasurer of Holly Sugar Corp. and Holly Oil Co., Colorado Springs, Colo., has been elected a vice president of Socal Oil & Refining Co., Huntington Beach, Calif.

Richard E. Houser, formerly superintendent of the reservoir engineering department for El Paso Natural Gas Co., has joined Brokaw, Dixon, & McKee, New York and Houston engineering and geological consulting firm, as a partner. He will be in charge of the Houston office.

F. B. Behrens has been appointed assistant general manager of transportation and supply for Richfield Oil Corp. He will continue as manager of the supply and distribution department. **M. E. Tracy** has been named assistant manager of the supply and distribution department.

Dr. William E. Bonnet, section chief, petrochemicals, in Sun Oil Co.'s process development department, has been named technical assistant to the director of research and development. **James F. Dempsey,** research engineer, will succeed Bonnet. Also, **Howard R. Moyer** and **Richard P. Barbor** have been named assistants in polypropylene development work for Sun.

Charles H. King, III, acting chief of the employe relations staff, manufacturing and research departments of Standard Oil Co. (Ohio), has been named manager of the marketing department employe relations staff. **John K. Voorhees,** general process superintendent at the Lima, Ohio, refinery, has been appointed chief of the employe relations division, manufacturing and research departments.

▶▶▶ Personals

E. L. Berry, plant superintendent for Warren Petroleum Corp. in Gladewater, Tex., has joined Natural Gasoline Corp., as plant superintendent in Hawkins, Tex.

Harold K. Johnston, Colorado sales manager for Empire Petroleum Co., Denver, has been elected vice president in charge of sales for the Rocky Mountain area. **William H. Ganley,** Wisconsin sales manager in Sheboygan, has been elected vice president in charge of sales in Wisconsin.

Robert Anderson, manager of Royalite Oil Co.'s supply department in the head office, Calgary, has been named manager of the refining and product supply department. He will be in charge of refinery operations, product supply, and finished product transportation. He will continue to headquarter in Calgary.

Robert P. Hamilton, vice president, general manager, and a director of Southeastern Pipe Line Co. has been elected president. He succeeds **M. E. Kilpatrick,** who has moved up to chairman of the board. A graduate of Pennsylvania State University, Hamilton joined Southeastern Pipe Line in 1939 as traffic manager. He was general superintendent for the company before being named vice president and general manager last year. Southeastern headquarters in Atlanta.

HAMILTON

J. H. Doores has been elected a vice president and general manager of the supply and traffic department of Esso Export Corp. He succeeds **P. C. Miller,** who has retired after 42 years with the company. Doores was formerly head of the coordination division in the coordination and petroleum economics department of Standard Oil Co. (N. J.).

Arthur F. Busch, assistant to the vice president in charge of marketing for Standard Oil Co. (Ohio), will retire September 1 after 47 years with the company.

▶▶▶ Personals

Dr. C. O. Tongberg, president of Jersey Production Research Co., Tulsa, has been elected executive vice president of Esso Research & Engineering Co., Linden, N. J. Both are subsidiaries of Standard Oil Co. (N. J.). **R. C. Curtis,** executive vice president of Jersey Production Research, will succeed Tongberg as president and chief executive officer.

TONGBERG

CURTIS

Tongberg will fill the Esso Research post formerly held by **E. Duer Reeves,** now executive vice president of Esso Standard Oil Co. Tongberg joined the Jersey Standard companies in 1937. He was vice president and a director of Esso Research before being named vice president and a director of Carter Oil Co. in 1956. He became Jersey Production Research president last year. He is a graduate of Harvard University and Pennsylvania State University. Curtis joined Carter in 1937. He was Carter production manager in Billings, Mont., and eastern division manager in Mattoon, Ill., before being named a vice president of Jersey Production Research in 1958. He is a graduate of Texas A&M College.

W. L. Kistler, Jr., Tulsa independent operator, **Rushton L. Ardrey,** senior vice president of Republic National Bank of Dallas, and **Charles W. Lewis,** senior partner in Townsend & Lewis, New York law firm, have been elected to the board of General American Oil Co. of Texas. Election of the new directors brings board membership up to 17. Kistler, who is also a director of Calvert Drilling, Inc., has been associated with General American in various property operations for some time.

Gilbert W. Miller, formerly in the technical services department at Monsanto Chemical Co.'s Monsanto, Ill., plant, has been appointed production coordinator in the organic chemicals division in St. Louis.

Alan P. Roberts, research engineer for Jersey Production Research Co., has been appointed head of the well testing and completion research section, drilling-development division. A graduate of Purdue University, Roberts joined the Standard Oil Co. (N. J.) companies in 1949.

Bernard E. Clark has been transferred by Continental Oil Co. from Denver to Houston, where he will be assistant to the manager of the chemicals division. He succeeds **Wilbur C. Kolar,** who was recently named superintendent of the Trainer, Pa., petrochemical plant.

Theodore W. Link, Amerada Petroleum Corp. petroleum engineer, has been transferred to Tatum, N. M., from Charlson, N. D.

Ted S. Cuellar, senior chemist at Sinclair Oil & Gas Co.'s Silsbee, Tex., gas products plant, has been promoted to assistant plant engineer.

Howard B. Wiley, sales manager for the New Orleans division of Texaco, Inc., has been promoted to assistant general sales manager of the southern region, a new position. He will headquarter in Houston. **Max Park,** assistant division sales manager in Houston, will succeed Wiley in New Orleans. **George C. Ash,** assistant division sales manager in charge of merchandising in Atlanta, has been named to succeed Park in Houston. **A. M. Card,** Houston district sales manager, has been transferred to Atlanta to succeed Ash.

John P. Dixon, general foreman in the wax refining, filtering, and acid department at the Casper, Wyo., refinery of Standard Oil Co. (Ind.), has retired after 40 years with the company.

R. R. Angel, division staff engineer in Houston for Phillips Petroleum Co., has been transferred to Corpus Christi, Tex., as district engineer.

Hugh H. Foreman, special engineer with Southern California Gas Co., was elected president of the National Association of Power Engineers, Inc., at the group's recent convention in Boston.

Frederick R. Loofbourow, manager of Esso Research & Engineering Co.'s contract and legal staff, has been named secretary and counsel of the company. He succeeds **Philip L. Young,** secretary since 1953, who becomes patents counsel.

B. B. Edwards, district engineer for Cities Service Oil Co. in Gladewater, Tex., has been transferred to Lafayette, La., in the same capacity.

Donald M. Beeson, group head in the production research division of Jersey Production Research Co., Tulsa, has been given a year's assignment in the chemical research division of Esso Research & Engineering Co., Linden, N. J.

E. J. Wacker, Jr., vice president of Magnolia Petroleum Co., has been given additional duties as assistant to **J. L. Latimer,** Magnolia president. Wacker will act in this capacity until merger of Magnolia and its affiliate, Mobil Oil Co., is complete.

D. L. Brown, district geologist, southern Rocky Mountains, for Kerr-McGee Oil Industries, Inc., has been transferred to Oklahoma City as central district geologist and assistant to the exploration manager. **Bob King,** formerly with Superior Oil Co., will succeed Brown.

J. J. Tanner, foreign exploration geologist in Phillips Petroleum Co.'s international department, has been promoted to manager of the company's new Australian operations. He will headquarter in Brisbane. **C. D. Hier,** assistant chief geophysicist in Phillips' land and geological department, has been appointed chief geophysicist for Australian operations. **H. H. Heikkila,** exploration projects supervisor in Denver, will be division geologist for Australian operations. Phillips has a joint interest with Sunray Mid-Continent Oil Co. in a 41-million-acre concession in Queensland. Tanner, a graduate of Princeton University, has been with Phillips since 1949. Hier joined the company in 1943 and Heikkila in 1949.

TANNER

John McKeever, staff geologist for Pan American Petroleum Corp. in Casper, Wyo., has been transferred to Bismarck, N. D., as exploitation geologist.

W. W. Neddo, assistant marketing division manager in Terre Haute, Ind., for Sunray Mid-Continent Oil Co., has been promoted to eastern division manager in Terre Haute. He succeeds **E. E. Marsau,** who has been named manager of the Oklahoma City district office.

Bob Lavington, recent Colorado State University graduate has joined Pan American Petroleum Corp. in Bismarck, N. D., as geologist.

Robert E. Larson, formerly division engineer in Cody, Wyo., for Continental Oil Co., has been named district superintendent in the company's new Lewistown, Mont., production district office. The new district will supervise Conoco's production in northern and eastern Montana. Others named to the district office staff are **Kent W. McDaniel,** district engineer, formerly a production engineer in Sussex, Wyo., and **Harold L. Brus,** district administrative coordinator, formerly in administrative posts with Conoco at Sussex.

J. C. Leutwyler, A. C. Allen, Jr., and **E. C. Michaelson** have joined California Research Corp.'s Richmond, Calif., laboratory as research engineers. **S. H. Sharman** has been named research chemist at Richmond, and **G. A. Paxson** has been appointed research mathematician there. **T. W. Todd** has joined the company's La Habra, Calif., laboratory as research geologist.

W. J. Lang, formerly exploration manager for Edward C. Lawson, Tulsa independent, has become consulting geologist-geophysicist in Tulsa. He had been with Lawson since 1956.

Dr. H. D. Medley, head of the basic process research section at Celanese Chemical Co.'s Clarkwood, Tex., research laboratories, has been appointed director of new chemical development in the product development department. He will headquarter in New York. Medley succeeds **Dr. H. L. Pilat,** who has joined Celanese Plastics Co.

L. B. Newman, partner in Consolidated Gas & Equipment Co., Plainview, Tex., will head the company's new Amarillo, Tex., office. **W. D. Paenack** will be Amarillo district manager.

W. C. Douce has been named assistant director of rubber chemicals sales for Phillips Chemical Co., Bartlesville, Okla.

Ray N. Fleck has been promoted research associate at Union Oil Co.'s Brea, Calif., research center.

Roy W. Ellis, manager of DX Sunray Oil Co.'s northern sales division in Waterloo, Iowa, has been named manager of the southern sales division. He will headquarter in Tulsa. Ellis succeeds **L. J. McCampbell,** who has been named manager of the Tulsa district sales organization. **Ken Yeager,** Tulsa district manager, has been appointed Tulsa city sales manager.

Joseph P. Kennedy, formerly with Celanese Corp. of America, has joined the chemicals research division of Esso Research Engineering Co. in Linden, N. J., as research chemist.

Lawrence D. Lively has been promoted to research chemist in the analytical section of Continental Oil Co.'s research services division, Ponca City, Okla. **J. R. Bowden** has been named research group leader in the petrochemical research division there.

Carl R. Sisson, formerly manager of Texas Eastern Transmission Corp.'s division 3, gas division operations, has been named manager of operations for the Little Big Inch division, a new position. He will be in charge of field operations for the company's products pipeline. Sisson will move his headquarters to Houston from West Chester, Pa. He has been with Texas Eastern since 1947 and had been a division manager since 1953.

M. S. Lush, managing director of Pakistan Shell Oil Co., Ltd., has retired. Lush joined Shell in 1952 as advisor on Libyan affairs.

▶▶▶ Personals

Albert E. Ernst, vice president of California Texas Oil Co., Ltd., has joined Continental Oil Co. as vice president. He will be in charge of development of foreign distribution of crude oil, natural gas, and refined products. He will headquarter in New York. Ernst joined Texaco, Inc., in 1925. During World War II he was chief of the petroleum division, Lend Lease Administration and Foreign Economic Administration. He had been with Caltex in New York since 1946. Ernst's appointment is effective October 1.

J. A. Ransford has been named to succeed **L. W. Parsons** as Tidewater Oil Co.'s Washington representative. Parsons will retire next month. Ransford has been with Tidewater since 1927.

John L. Hoyt, Jr., New Orleans district superintendent for Pan American Petroleum Corp., has been promoted to division production superintendent for the North Texas-New Mexico division in Fort Worth. He succeeds **Earl V. Hewitt,** who is retiring. Hoyt had been district superintendent in New Orleans since 1957.

Roger M. Matson, formerly vice president of Alex W. McCoy Associates, Tulsa, has joined Vickers Petroleum Co., Inc., as consultant geologist. He will headquarter in Denver. Matson was with Gulf Oil Corp. before joining McCoy Associates in 1955. He is a graduate of the University of Washington.

▶▶▶ Deaths

Claude Woessner, 64, retired general manager of foreign production for Gulf Oil Corp. in New York, died August 17 in a Houston hospital after a heart attack. Woessner joined Gulf in 1929 in Venezuela. He had lived in Houston since his retirement in 1956.

Harry Kuegler, retired manager of supply and transportation for Mobil Oil Co. in Detroit, died recently.

Edmund J. Simonis, 54, owner of Boulder Oil Well Supply Co., president of Norsim Oil Co. and former president of Santa Maria Drilling Corp., died August 18 in Long Beach, Calif.

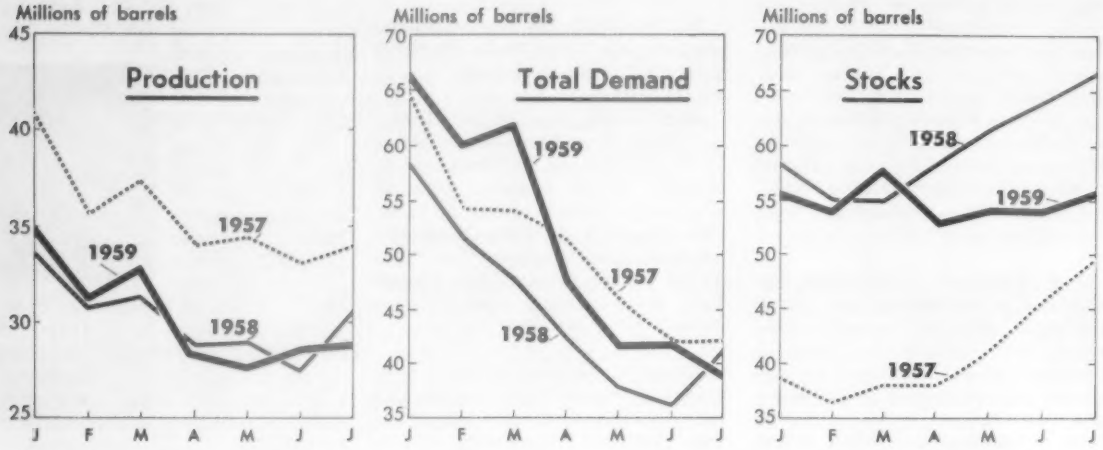
Joseph B. Ladd, 74, retired engineer with Standard Oil Co. of California, died August 17 in a Bakersfield, Calif., hospital. Ladd retired in 1947.

George K. Martin, Sr., 68, retired independent operator, died August 23 in a Houston hospital. Martin had been in partial retirement for 15 years.

Matthew Murray, 82, retired drilling contractor, died August 24 in a Tulsa hospital. Murray had headquarters in Broken Arrow, Okla., for many years before moving to Tulsa.

Samuel Asa Morse, 83, retired pioneer oil man, died August 24 in a Houston hospital. Morse entered the oil business in 1907 in Spindletop field. He became first field superintendent for Humble Oil & Refining Co. shortly afterwards. He later was active in Burkburnett field as a drilling contractor. Before his retirement in 1931 he worked with Aguila Oil Co. in Mexico as field superintendent.

Production drops . . . demand eases off . . . and stocks also level off



Oil's bright outlook hinges on strike

BY BILL BACHMAN

PETROLEUM DEMAND should continue strong through the next 3 months unless the steel strike remains unsettled and begins to slow down the nation's industrial machinery.

This assessment of the outlook was made by the Independent Petroleum Association of America.

IPAA economists predict total petroleum demand averaging 9,500,000 bbl. daily through November.

This would be an increase of 350,000 bbl. daily or 3.8% for the same September-November period last year. It also would be a 650,000-bbl.-daily increase over total demand for the May-July period.

Disappointment . . . A slowdown in oil activities during July—probably partly due to the steel strike—lowered expectations for the May-July period.

Total demand in May-July averaged 8,815,000 bbl. daily, an increase of 255,000 bbl. daily or 3% over the same period last year.

The IPAA reports, however, this was 156,000 bbl. daily below its previous expectations.

Extent to which the steel strike caused the disappointing July business cannot be measured accurately at this time, the IPAA reported.

Residual fuel oil alone used directly by the steel industry totals about 100,000 bbl. daily.

One result of a poor July business was a sharp increase in total inventories. Addition to inventories was about 5 million barrels placing the total at the end of July at 43 million barrels above the year-ago level.

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	6,827,290	UP	14,140	DOWN	43,760
Crude stocks	261,848,000	UP	386,000	UP	11,468
Completions	951	UP	5	UP	14
Refinery runs	8,214,000	UP	264,000	UP	322,000
Gasoline stocks	181,422,000	DOWN	1,682,000	UP	7,666,000
Kerosine stocks	29,948,000	UP	475,000	UP	2,400,000
Distillate stocks	153,122,000	UP	5,215,000	UP	20,724,000
Residual stocks	56,629,000	UP	1,104,000	DOWN	10,365,000
Four-product stocks	421,121,000	UP	5,112,000	UP	20,425,000
Total imports	1,585,000	UP	222,700	UP	144,000

Prices . . . Prices of all refined products are still below levels of last year at this time and are near the 1958 recession low.

Gasoline prices, however, firmed up in the last few weeks just as the motoring season begins to diminish. Distillate and residual prices have tended weaker.

The prices for distillate and residual now are becoming more important with the motoring season winding up and the heating season nearly upon us. Demand for distillate and residual so far this year has been pretty good—up 1.3% for distillate and 12.2% for residual.

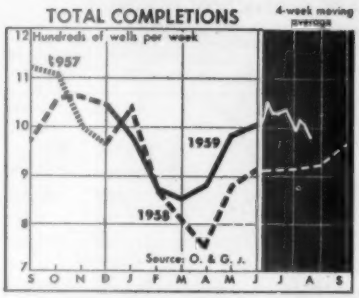
The charts show the performance for residual so far this year.

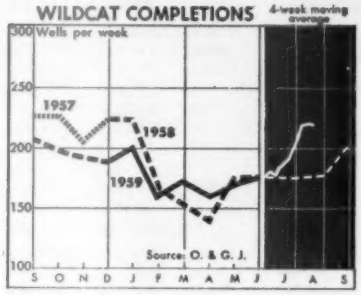
Total residual demand in July was 38,763,000 bbl., about 2 million barrels less than in 1958.

Residual production in July totaled 28,710,000 bbl., a drop of 1.7 million from last year. For the year production has hung close to 1958 levels. Imports of residual also have eased off. They totaled 320,000 bbl. daily in June, a decline of nearly 34,000 bbl. daily from the month before.

Residual stocks have been running lower than in 1958 so far this year. They totaled 55,600,000 in July compared with 66,457,000 last year. More than half of the inventories—26,675,000 bbl.—are located on the West Coast. This puts stocks for the rest of the nation in good position.

What happens to residual the rest of the year naturally will depend on demand, where the steel strike and weather play a part, and new supply which is a compound of domestic production and imports.





Active Rotary Rigs

	8-24-59	8-17-59	8-25-58
Alabama	9	9	6
Arkansas	14	12	25
Arizona	2	1	2
California	92	84	73
Land	90	82	(*)
Offshore	2	2	(*)
Colorado	56	54	38
Florida	2	2	1
Land	1	1	1
Offshore	1	1	0
Illinois	39	33	59
Indiana	7	6	10
Iowa	2	2	3
Kansas	129	139	159
Kentucky	7	13	6
Louisiana	345	336	293
North	46	44	32
S. Inland waters	139	128	(†)
S. Land	110	109	225
Offshore	50	55	36
Maryland	0	0	0
Michigan	28	30	10
Mississippi	74	74	41
Missouri	1	1	1
Montana	28	28	20
Nebraska	27	32	23
Nevada	1	1	0
New Mexico	117	119	104
New York	1	1	2
North Dakota	25	24	27
Ohio	3	4	0
Oklahoma	201	220	209
Oregon	0	0	0
Pennsylvania	12	10	10
South Dakota	7	7	3
Texas	791	782	669
S. Inland waters	5	8	(†)
S. Land	215	214	137
Offshore	1	2	0
North-East	179	156	(*)
West Central	250	268	(*)
West	141	134	(*)
Utah	34	37	31
Washington	2	2	1
West Virginia	8	10	6
Wyoming	76	73	62
Total U. S.	**2,140**	2,146	1,894
Western Canada	163	155	157
Eastern Canada	0	0	2
Grand total	2,303	2,301	2,053

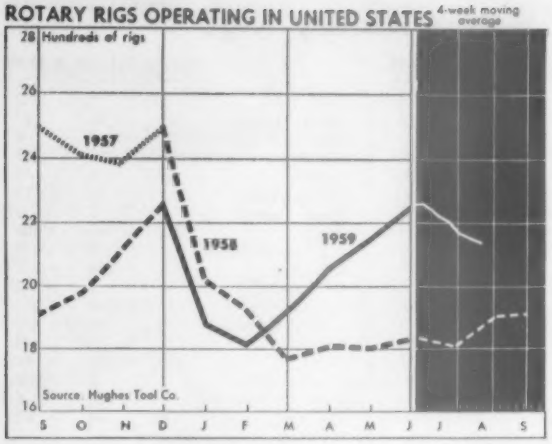
Hughes Tool Co. report. *Comparisons not available due to change in method of reporting. †Included in South-Land.

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 22, 1959

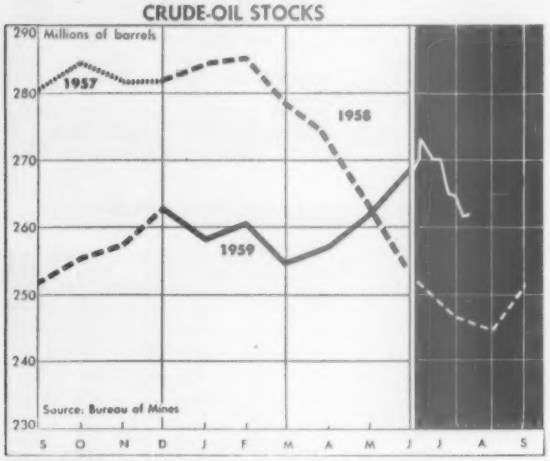
	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	1	1	0	0	0	0	11,633	61	48	0	0	0	0	0	16	18
Arkansas	19	10	0	0	9	0	60,946	542	462	2	0	0	0	2	93	109
California	28	17	0	3	6	2	156,426	967	1,051	10	1	0	3	6	240	239
Colorado	13	3	0	0	10	0	77,707	485	510	8	1	0	0	7	290	294
Illinois	44	20	0	0	24	0	96,745	1,398	1,358	14	0	0	0	14	234	263
Indiana	20	5	0	0	15	0	28,417	522	473	8	0	0	0	8	172	174
Kansas	84	42	0	4	38	0	287,681	2,570	2,407	17	1	0	0	16	606	513
Kentucky	14	3	0	0	11	0	24,980	1,544	710	7	0	0	0	7	139	82
Louisiana	69	29	8	2	30	0	588,499	2,309	2,189	17	2	1	0	14	312	316
North	26	11	0	2	13	0	106,671	854	784	8	0	0	0	8	128	126
South	38	15	8	0	15	0	428,711	1,212	1,115	9	2	1	0	6	172	171
Offshore	5	3	0	0	2	0	53,117	243	290	0	0	0	0	0	12	19
Michigan	12	4	0	1	2	5	33,890	396	270	3	0	0	1	2	99	90
Mississippi	12	6	0	0	6	0	102,577	398	252	6	1	0	0	5	179	118
Montana	9	3	0	0	6	0	42,653	205	213	1	0	0	0	1	62	90
Nebraska	18	5	0	0	13	0	108,051	559	441	10	1	0	0	9	242	210
New Mexico	47	26	0	10	10	1	240,386	1,297	1,282	6	1	0	0	5	156	166
West	24	8	0	10	5	1	94,695	596	621	1	0	0	0	1	44	73
East	23	18	0	0	5	0	145,691	701	661	5	1	0	0	4	112	94
New York	0	0	0	0	0	0	0	172	393	0	0	0	0	0	16	32
North Dakota	7	5	0	0	2	0	48,751	320	292	0	0	0	0	0	61	95
Ohio	14	4	0	4	3	3	33,270	616	669	1	0	0	0	1	18	9
Oklahoma	106	80	0	2	19	5	378,300	3,701	4,110	6	1	0	0	5	545	569
Pennsylvania	0	0	0	0	0	0	0	335	418	0	0	0	0	0	9	9
Texas	373	205	11	11	137	9	1,597,870	12,244	11,482	87	6	2	2	77	2,301	2,323
District 1	39	23	0	2	14	0	103,529	731	628	14	2	0	0	12	211	252
District 2	17	6	4	1	6	0	125,477	517	488	6	1	1	1	3	154	128
District 3	26	10	4	0	12	0	181,831	775	826	3	1	0	0	2	151	181
District 4	26	7	3	3	13	0	156,003	847	767	6	0	1	1	4	206	222
East	34	23	0	0	11	0	144,030	774	780	7	0	0	0	7	150	216
District 7-B	53	27	0	0	25	1	173,369	1,679	1,538	16	1	0	0	15	439	430
West	89	67	0	1	20	1	444,432	3,770	3,333	17	1	0	0	16	525	461
District 9	68	27	0	2	32	7	178,780	2,299	2,317	15	0	0	0	15	394	368
District 10	21	15	0	2	4	0	90,419	852	805	3	0	0	0	3	71	65
Utah	1	1	0	0	0	0	5,672	201	262	0	0	0	0	0	54	56
West Virginia	24	2	0	18	3	1	77,370	494	458	3	0	0	2	1	18	12
Wyoming	30	14	0	0	15	1	104,165	623	467	8	1	0	0	7	208	134
Misc. (Tenn.)	6	0	0	0	6	0	4,323	84	63	6	0	0	0	6	51	55
Total U. S.	**951**	485	19	55	365	27	4,110,312	32,043	30,280	**220**	16	3	8	193	6,121	5,976
Previous week	946	475	15	77	375	4	4,005,389	.....	.....	209	21	0	7	181	.....	.....
Cum. 1959	32,043	16,209	781	2,316	11,898	839	133,007,089	.....	.....	6,121	580	82	184	5,275	.....	.....
Cum. 1958	30,280	14,913	743	2,303	11,540	781	126,038,829	.....	.....	5,976	590	102	182	5,102	.....	.....
Western Canada	66	25	0	9	12	0	196,256	1,617	1,557	9	3	0	0	6	459	428
Ontario	16	1	0	4	11	0	24,770	154	.....	.....	.....	.....	.....	.....	.....	.....

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES



CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	8-15-59	8-8-59	8-16-58
Pennsylvania	2,631	2,596	2,874
Other Appalachian	1,956	2,112	1,469
Illinois, Indiana, Michigan	9,974	9,948	10,986
Nebraska and North Dakota	2,910	3,067	2,046
Kansas	9,797	9,691	9,722
Oklahoma	16,315	16,340	15,574
Arkansas	2,124	2,144	1,880
Louisiana	19,243	19,229	16,636
North	3,368	3,066	2,898
South	15,875	16,163	13,738
Mississippi, Alabama, Florida	2,688	2,689	2,427
New Mexico	7,837	7,751	7,081
Texas	113,874	114,159	102,458
East Texas	8,837	8,877	8,211
West Texas	53,662	53,652	49,311
Texas Gulf	19,902	19,971	18,770
Other Texas	31,473	31,659	26,166
Wyoming	15,573	15,353	13,738
Other Rocky Mountain	9,724	9,828	9,861
California	31,763	31,250	36,789
Foreign	†15,439	15,305	16,497
Total	**261,848**	261,462	250,038

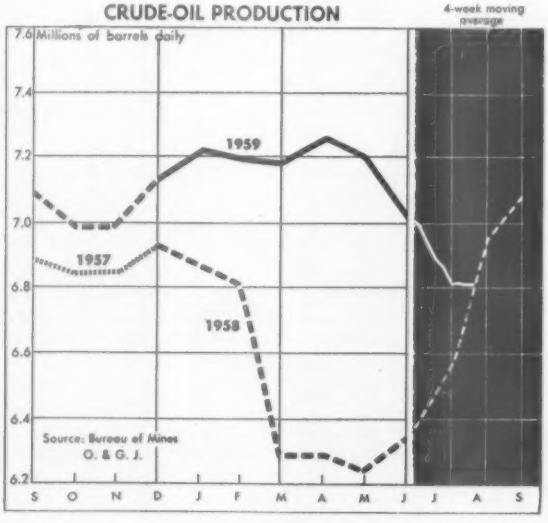
*Bureau of Mines. †Includes 5,102,000 bbl. in California.

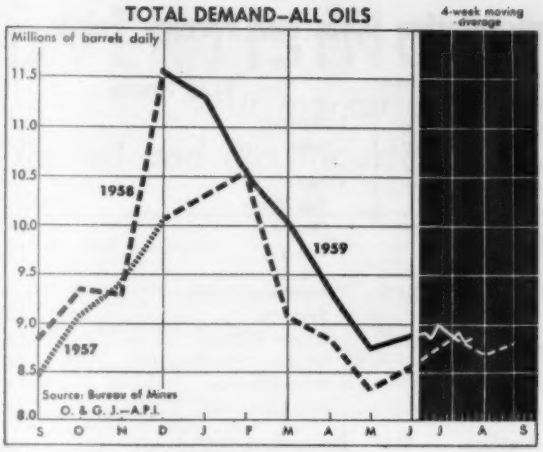
DAILY AVERAGE PRODUCTION FOR WEEK

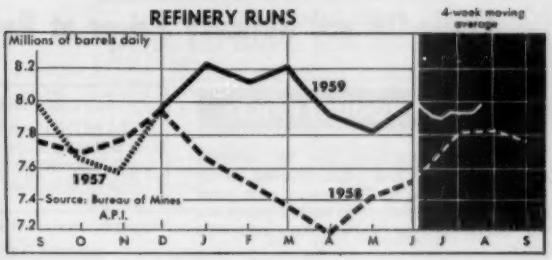
	August 22, 1959			Aug. 15
	Crude oil	Lease condensate	Total	total
Alabama	16,000	.....	16,100	16,500
Arkansas	45,770	280	46,050	45,600
California	844,800	.....	844,800	846,200
Colorado	124,000	.....	124,000	122,800
Eastern	41,000	.....	41,000	42,000
Florida	1,130	.....	1,130	1,130
Illinois	211,800	.....	211,800	207,400
Indiana	32,300	.....	32,300	31,900
Kansas	†309,480	.....	†309,480	†301,770
Kentucky	92,700	.....	92,700	92,200
Louisiana	950,600	97,400	1,048,000	1,047,300
North	109,600	4,900	114,500	113,800
South	841,000	92,500	933,500	933,500
Michigan	27,600	.....	27,600	27,200
Mississippi	133,500	3,750	137,250	137,250
Montana	78,700	.....	78,700	78,300
Nebraska	61,900	.....	61,900	60,800
Nevada	100	.....	100	100
New Mexico	280,500	5,000	285,500	285,500
North Dakota	39,500	.....	39,500	38,300
Oklahoma	†514,160	.....	†514,160	†515,930
Texas	2,386,000	70,480	2,456,480	2,456,480
Dist. 1	43,000	2,300	45,300	45,300
Dist. 2	99,000	7,600	106,600	106,600
Dist. 3	315,000	35,500	350,500	350,500
Dist. 4	168,000	8,500	176,500	176,500
Dist. 5	28,000	350	28,350	28,350
Dist. 6	102,000	6,200	108,200	108,200
East Texas field	129,000	.....	129,000	129,000
Dist. 7-B	130,000	100	130,100	130,100
Dist. 7-C	113,000	3,230	116,230	116,230
Dist. 8	945,000	4,000	949,000	949,000
Dist. 9	205,000	1,600	206,600	206,600
Dist. 10	109,000	1,100	110,100	110,100
Utah	114,400	.....	114,400	113,200
Wyoming	344,100	.....	344,100	345,000
Others	‡240	.....	‡240	‡290
Total U. S.	6,650,380	176,910	**6,827,290**	6,813,150
Change from previous week, up			**14,140**	
Canada	(§)	.....	(§)	†499,520
Total U. S. production—January 1-August 22			1,660,407,895 bbl.	
Same period last year (crude plus cond.)			*1,526,002,240 bbl.	

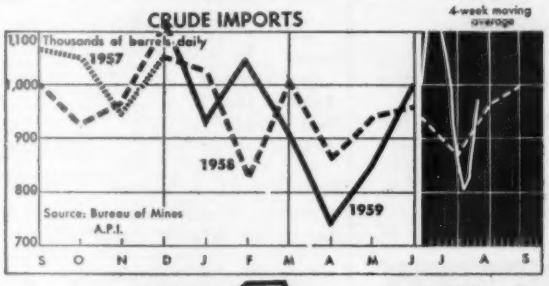
*Includes 36,834,240 bbl. condensate. †Week ended previous Monday. ‡Arizona, South Dakota, and Washington. §Delayed.

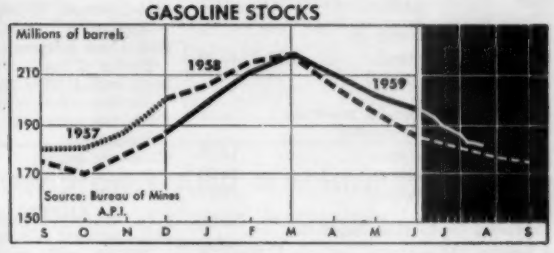
CRUDE-OIL PRODUCTION

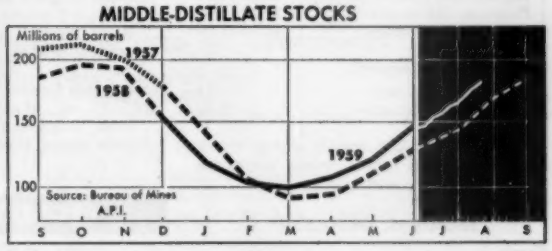


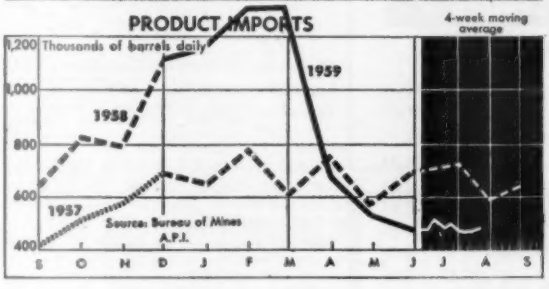


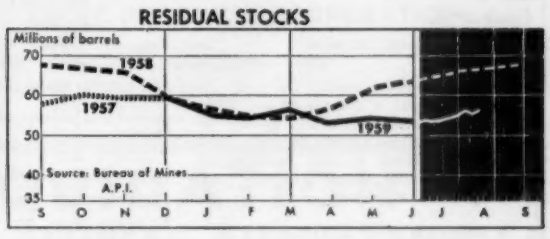












API REFINERY REPORT, AUGUST 21, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.	Stocks‡— Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, August 1958— Daily avg. runs	Daily average production— Gaso.*	Kero.	Dist.	Resid.
East Coast	1,157	544.1	32.0	355.3	149.4	43,500	11,408	58,104	11,751	444.7	522.0	25.2	283.3	175.9
Appalachian:														
District 1	95	42.3	0	25.0	5.9	5,722	584	3,597	355	96.0	43.9	3.3	21.0	5.9
District 2	105	56.9	1.1	20.4	8.0	2,629	535	1,503	328	104.5	56.6	5.2	19.7	9.3
Ind., Ill., Ky.	1,521	796.7	69.7	316.0	137.0	31,566	7,219	25,312	5,017	1,372.7	750.9	55.3	288.8	123.8
Minn., Wis., Dak.	103	50.3	8.0	19.1	11.3	6,604	1,354	6,919	457	51.3	54.3	4.0	29.8	8.1
Okla., Kans., Mo.	731	395.6	6.7	192.6	23.6	16,660	1,538	11,088	805	752.1	429.1	13.5	176.5	23.1
Inland Texas	304	219.9	10.0	55.6	23.4	7,253	507	1,918	2,143	283.3	207.0	7.6	52.2	19.0
Texas Gulf Coast	1,864	967.0	105.6	454.9	172.2	21,235	2,934	17,786	6,206	1,740.2	952.3	89.8	442.3	184.1
La. Gulf Coast	743	375.6	47.1	180.0	56.7	9,652	2,191	7,274	1,514	652.4	369.0	48.1	145.4	47.2
N. La. and Ark.	58	33.1	0	14.4	4.7	4,588	822	1,697	165	93.0	40.3	6.4	22.0	5.7
Rocky Mountain:														
New Mexico	26	12.6	0.9	4.7	3.1	781	41	178	104	24.4	12.9	0.4	4.8	2.1
Other Rky. Mt.	308	144.4	0.3	61.1	37.4	4,724	358	3,062	1,083	282.5	133.9	2.4	57.4	30.9
West Coast	1,199	549.5	12.7	186.2	258.9	26,508	457	14,684	26,701	916.9	509.4	3.4	162.5	325.8
Aug. 21, 1959	8,214	4,188.0	294.1	1,885.3	891.6	181,422	29,948	153,122	56,629	6,814.0	4,081.6	264.6	1,705.7	960.9
Aug. 14, 1959	7,950	4,153.9	277.0	1,717.7	853.3	183,104	29,473	147,907	55,525	.....	.....	.....	.....	.....
Aug. 22, 1958	7,892	4,000.7	255.9	1,714.9	958.6	173,756	27,548	132,398	66,994	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):	
Regular (91 octane)	11.75-12.00
Premium (99 octane)	14.50-14.75
Gulf Coast (cargoes for coastwise or export movements):	
Regular (90 octane)	10.75
Regular (92 octane)	11.00
Premium (98 octane)	12.25
California (rack) (Los Angeles):	
Regular (88 octane)	12.00-12.50
Premium (94 octane)	13.00-13.50
Premium (100 octane)	14.50-15.00
Caribbean area (cargoes):	
Regular (87 octane)	10.375
Premium (97 octane)	12.00

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:	
Grade 26-70	4.5
Breckenridge:	
Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):	
Kerosine 42-44	9.25-9.75
Diesel oil (58 d.i. and above)	9.00-9.50
Distillate No. 1	9.00-9.50
Distillate No. 2	8.25-8.75
Gulf Coast (cargoes):	
Kerosine 41-43	8.25-8.375
Distillate No. 2	7.75-7.875
New York Harbor (barges):	
Kerosine 41-43	9.60
Distillate No. 2	9.10
Diesel fuel, 48-52 d.i.	9.40
Caribbean area (cargoes):	
Distillate No. 2	8.125

WAX (LB.)

Oklahoma (Group 3):	
132-135 A.m.p. (semi-refined) in tank car	6.50
New York (export):	
126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

NOTICE

STARTING with the first issue in September, The Oil and Gas Journal will discontinue price reporting for natural gasoline, wax, and lubricating oils.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):	
Residual fuel (max. 1% S)	$1.75-1.90
Gulf Coast (cargoes):	
Bunker C fuel	$2.00
New York Harbor (barges):	
Bunker C fuel	$2.37
Caribbean (cargoes):	
Bunker C	$2.00
California (rack):	
Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):	
150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5
Pennsylvania Grade:	
145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	23

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Okla-homa	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17.17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.49	....	$2.35	2.06
21-21.9	2.50	2.52	....	2.38	2.11
22-22.9	2.60	2.55	....	2.41	2.16
23-23.9	2.69	2.58	$3.44	2.44	2.21
24-24.9	2.78	2.61	3.46	2.47	2.26
25-25.9	2.84	2.64	3.48	2.50	2.31
26-26.9	2.90	2.67	3.50	2.53	2.36
27-27.9	2.95	2.70	3.52	2.56	2.49
28-28.9	3.01	2.73	3.54	2.59	2.54
29-29.9	3.07	2.76	3.56	2.62	2.59
30-30.9	3.12	2.79	....	2.65	2.63
31-31.9	3.20	2.82	....	2.68	2.67
32-32.9	3.27	2.85	....	2.71	2.71
33-33.9	3.34	2.88	....	2.74	2.75
34-34.9	3.41	2.91	....	2.77	2.79
35-35.9	3.47	2.94	....	2.80	2.83
36-36.9	3.52	2.97	....	2.83	2.87
37-37.9	3.56	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 4-1-59.

FLAT PRICES

Louisiana:	
Sweet Lake	$3.00
Texas:	
East Texas	3.05-3.25
Conroe	3.53
Van	3.08
Pennsylvania Grade:	
Bradford	4.25
Middle District	4.07
Southwest Pennsylvania	3.80
West Virginia	3.62
Buckeye Grade	3.47
Illinois Basin	3.00

FOREIGN

Canada:	
Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38
Venezuela:	
Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	2.10
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):	
Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05
Middle East, E. Mediterranean:	
Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29
Far East (cargoes, f.o.b. Lutong, Sarawak):	
Seria Light, 37°	2.57

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

Gulf-USNH, dirty (ATRS—32.5%)	$1.92
★ Carib.-Montreal, dirty (ATRS —55%)	1.82
★ Carib.-Sweden, dirty (Scale —50%) (17s. 5d.)	2.45
★ PG-France, dirty (USMC—71%)	3.16

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:
UNDISPLAYED CLASSIFIED 25c a word one issue. 10% discount three or more consecutive issues. $5.00 minimum charge. Blind Box in our care nine words. Payable in advance.

DISPLAY CLASSIFIED
$19.00 a column inch one issue . . .
10% Discount three or more consecutive issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EXCEPT . . .

WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona) Write: Classified Departments, Inc., The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif. Phone AXminister 2-0257.

FOR SALE EQUIPMENT

1—750 HP B&W Marine Type Boiler H. F. Richardson, Box 888, Gladewater, Texas.

LIQUIDATING—2½ million btu Petro-Chem Heater; 12,000 gallon Propane Tank; Gas Compressors—Cylinders; Pumps; Fractionating Towers; Steel Tanks—Vessels; Shell—Tube Heat Exchangers; Atmospheric Cooling Sections; Boilers; Steel Buildings; Electric Generator Sets; Orifice Gas Meters; CO_2 Fire Extinguishers; Pipe; Valves. Plant idle. All must go. Send for detailed list. Kinslow Equipment Company—P. O. Box 5283—Tulsa 12, Oklahoma—WE 9-6896.

18" AND 20", good used pipe. Very attractive prices. Contact: The Tri-State Pipe Co., Bellaire, Ohio. Telephone OR 6-1452.

1 BUCYRUS—ERIE 36L Spudder, late model. Rig complete with tools and equipment. Cassel Drilling Co. Inc., Dumas, Texas. Phone WE 5-5019 or WE 5-4369.

3 COMPLETE UNIT rigs for sale. U-15 drawworks. 2 Rigs are powered by 3 NKU Waukesha engines. 1 rig powered by 2 LRO Waukesha engines. Drill pipe and collars optional. Rigs may be seen at Henson Drilling Company yard in Abilene, Texas. Complete inventory on request.

MODEL U-34 UNIT Drawworks, complete with 15" single Parkersburg Hydraulic Brake. Model WAK Waukesha Engine complete with ICK starting engine. 87' Lee C. Moore Cantilever type Mast complete with 4'x35½' substructure. Dave Morgan Oil Co., Box 820, Phone 295, Blackwell, Oklahoma.

FOR SALE U-15 Rig, call Central Tool & Supply Company Main 4-6651, Liberal, Kansas; Central 2-6318, Oklahoma City.

1—HERCULES FILTER Model 300, 50" diameter, Monel construction quick opening door, rotating cleaning mechanism. 4" inlet—4" outlet, three 4" drains connected to 8" drain header. Unitized on steel platform and complete with metering and centrifugal pumps, four electric motors and control panel. Filtering capacity 10,000 BWPD. New cost $27,000.00, never used. Additional description on request. Sell for 17,500.00—located near Grandfalls, Texas. Box L-470, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—133' IDECO Full View Portable Mast, 9' Substructure, Wilson Giant single drum drawworks, complete with two engine compound, Oilwell 20½" rotary table with torque converter, 7⅛ x 16 Bethlehem G-300 Pump. Excellent condition guaranteed. Kirkpatrick Oil Co., 1300 N. Broadway, Oklahoma City, Phone CE 9-1416.

BLACK'S OF SCOTLAND—makers of Tents and Sleeping Bags and suppliers of a complete range of rugged Field Equipment serve the leading Oil & Exploration Companies in development projects all over the world. Write for full list. Black's, Greenock, Scotland.

FOURTEEN USED OIL iron tanks. Capacity of each tank is 35,000 barrels. Weight of each tank is about 70 tons. These tanks are in excellent condition and can be used again for oil. For further information contact: West Ohio Pipe Company, P. O. Box 193, Lima, Ohio. Phone CA 6-0821.

—PIPE—
500,000 ft. 10¾" O.D. 35#
200,000 ft. 8⅝" O.D. 28½#
100,000 ft. 12¾" O.D. 40#
20,000 ft. 16" O.D. 42#.
all No. 1 grade, plain end cleaned.
INDIANA-OHIO PIPE CO.
P. O. Box 5412 Shepard Sta.
Phone C.L. 3-5527.
Columbus 3, Ohio.

FOR SALE EQUIPMENT

1—U-15 Unit Rig Drawworks, with 2 Engine Unit Rig Compound with Pump Drive, Parkersburg 15" Dual Hydromatic Brake, Lebus grooved drum. Two Model LI-600 Cummins Engines. These engines have been converted to gas and have air starters. $8,000.00. Location: Kermit, Texas, phone JUniper 6-3491. Iverson Supply Company, Tulsa, Oklahoma.

FOR SALE EQUIPMENT

GAS METERS: Westcott Series A-75 Orifice Meters, 2,000 Lb., 100", Teflon Bearings and Mac Nick Clocks. All Types Foxboros. 250 Lb. 60-B Metric Positive Meters. George Milner. Box 124. Okmulgee, Okla.

TWO CARDWELL Spudders. Both complete and in good working order. Inventory available. Box 178, Carmi, Ill.

NEW IDECO RIGS AND MACHINERY

RECONDITIONED AND USED MACHINERY
USED RIGS

SAVE ON GOOD USED RIG ACCESSORIES

1—National FE-17½ Rotary Table • **Oklahoma City**
1—Emsco 0-17½ Rotary Table • **Oklahoma City**
1—McKissick 48" x 30" Four Sheave Traveling Block with Byron Jackson 460 Hook • **Oklahoma City**
2—Cameron 10"—Series 900 QRC Blowout Preventers • 1—**Odessa** • 1—**Oklahoma City**
1—7⅜" O.D. Bowen Series 200 Overshot • **Oklahoma City**
1—7⅜" O.D. Bowen Series 150 Overshot • **Oklahoma City**
Other good used rig accessories including hooks—Tongs—Elevators—Slips—Weight Indicators—Rotary and Vibrator Hose—Tanks—Tool and Bunk Houses, etc.

LUCEY

LUCEY PRODUCTS CORPORATION
624 So. Cheyenne Ave. Tulsa 19, Oklahoma
Phone: LUther 4-4711
Oklahoma City—Woodward, Oklahoma • Dallas—Odessa, Texas

LIQUIDATION

at ESSO REFINERY, Baltimore, Md.

- COMPLETE UNITS: FLUID COKER; CATALYTIC CRACKER; GIRBOTOL
- 20 Towers 2'6" to 16' dia. x 20' to 145', up to 300 psi.
- 50 Pressure Vessels from 12' x 50' to 3' x 7' up to 300 psi.
- 250 Heat Exchangers and Condensers 7,500 to 100 sq. ft.
- 20 Reboilers 2,700 to 450 sq. ft.
- 125 Hot Oil, Centrifugal and Steam Pumps.
- 3—500 HP RA5 Clark Gas Engine Compressors 17" x 14"
- 3—22,500 cfm I.R. Turbo Blower 29.65 psia. Motor or Turbine
- 7860 cfm CLARK Compressor 153 psia. 2000 HP Motor
- Reactor, Stripper & Scrubber 12'6" x 112' Stainless Internals
- 2—7000 BBL. Storage Tanks ½" to ¼" Plate Welded
- 1500 Controlling, Indicating, Transmitting Instruments

Hundreds of other items—send for complete catalog

HEAT & POWER CO., Inc.

Site Office—Boston & Haven Sts., P. O. Box 5203, Baltimore 24, Md., Dickens 2-0224
New York Office—60 East 42nd Street, New York 17, N.Y., MUrray Hill 7-5280
Tulsa Office—306 Thompson Bldg., Tulsa 3, Okla., Diamond 3-4890

SALES AGENTS FOR LIPSETT, INC.

Another Large Auction

GLENN W. BOOKER OILFIELD SERVICE

LOCO HILLS, NEW MEXICO

"Going Out Of Business Sale"

Tuesday, September 22, 1959
10:00 A.M. (MST)

Registration Beginning at 9

Inspection Starting September 15, Until Sale Starts

REAL ESTATE, OILFIELD AUTHORITIES, WELL SERVICE EQUIPMENT AND TOOLS, TRUCKS, TRAILERS, SHOP AND OTHER EQUIPMENT, PIPE, RADIO SYSTEM.

Glenn W. Booker Oilfield Service is going out of business and has commissioned Wayne Cook Associates, Inc. to sell all of their service equipment and tools, supplies, real estate, trucks, trailers, scrap, pipe and tubing and all other equipment as well as oilfield authorities at public auction. Everything will be sold to the highest bidder.

THERE ARE NO MINIMUMS OR RESERVATIONS

The sale will include:

REAL ESTATE—approx. 2½ acre yard in Lovington, N.M. Fenced, trees, house and office.

AUTHORITIES—ICC No. MC 43387 between parts of Texas and Oklahoma Texas Intra No. 5045 with Wales Record

SERVICE EQUIPMENT incl. 3 Franks 658 Double Drum Units, Franks 9000 Double Drum Unit, Franks 658 Single Drum Unit, 2 Cardwell Model H Single Drum Units, Wilson Jr. and Wilson Sr., Cardwell Double Drum Mobilhoist, Reverse Circulation Rig, 3 sets of BJ Power Tongs. Some equipment is trailer and some truck mounted.

TRUCKS, TRAILERS, DIRT EQUIPMENT incl. 1950 Chev., 1200 gal. Propane Tank; 1952 Chev. Winch Truck; 1948 Int. Winch Truck; GMC 630 Tractor; Hobbs Tandem Float; Tandem Pole; Cat. D7 Cable Dozer; A-C Model D; Buda Line Hole and Anchor Digger and others.

COMPLETE MOTOROLA RADIO SYSTEM WITH 285 FT. MAST.

MANY FEET OF PIPE, TUBING AND CASING AND TONS OF STRUCTURAL PIPE AND ANGLE IRON.

OILFIELD TOOLS incl. Cable Tools, Line Scale Weight Indicators, Chain and Casing Tongs, Elevators, Spiders, Unions, Changeovers, Nipples, Gate Valves, Blocks and much more.

SHOP EQUIPMENT incl. Boring Bar, Valve Grinder, Bench Grinder, Battery Charger, Jacks, Socket Sets, Drills, Wide assortment of truck and car parts, Hoists, Welders and many more items.

THE LIST IS FAR TOO NUMEROUS TO LIST HERE. FOR BROCHURE WITH DETAILED LISTING, CONTACT:

Wayne Cook Associates, Inc.

"The Nation's Leading Auctioneers"

192 Meadows Building, Dallas 6, Texas
EMerson 3-3388

WANT TO SELL?
Learn why auction is your best way and we can do the best job. Call today collect. No obligation, of course.

FOR SALE EQUIPMENT

1500 Failing heavy duty, 2⅜" 2⅞" drill pipe, drill collars. 22 Bucyrus 4½" stem. Fred Butler, Box 481, Pueblo, Colo.

FLOATING ROOF TANKS
(Imme. Delivery)
(4)—23,500 Bbl., 60' Dia. by 46' 7" High
(2)—24,000 Bbl., 60' Dia. by 48' High
All Chicago Bridge & Iron—standing at locations Missouri and Illinois, used good condition—suitable re-erection.

MID-STATES PIPE AND SUPPLY CO.
TULSA, OKLAHOMA
P. O. Box 2534 Ph. CH 2-9128

One repressuring or complete gasolene plant. Two twin Superior ninties, tanks, meters, regulators, with fifteen thousand feet gather lines. Ready to run.

Fifteen Oklahoma stripper wells, containing twenty thousand recoverable casing, thirty thousand feet rods 7 tubing, jacks, engines, pumps, tanks, separators. Some on good floodable leases. Cash or lease or trade for good stock. Gerald T. Shipman, Short Hills, N. J. DRexell Phone 6-2215.

IMMEDIATE DELIVERY

Pipe: 40,000 ft. 2⅜" 9% nickel P-105 Tested 9500#—95 cents per foot; 10,300 ft. 4½" Grade E 1660# X-Hole Reed Shrink Grip drill pipe, Tuboscope No. 2N3—$1.75 per foot.
1—Truck mounted hydrostatic Pipe Testing Machine with all fittings—$1,250.00.

Buy—Sell—Trade used pumping units.

Pumping Units Co. of Texas
134 Nellie Esperson Bldg.
Phone CA 7-0295,
Houston 2, Texas

NEW LINE PIPE

11,000'	16" OD x .281 Wall	47.2#
6,600'	16" OD x .312 Wall	52.35#
4,600'	16" OD x .188 Wall	31.66#
10,900'	12¾" OD x .250 Wall	33.37#
50,000'	4½" OD x .188 Wall	8.64#

All Electricweld, Mill Tested, app. 40' DRL, Beveled. Priced attractively. Prompt shipment Detroit, Michigan, and Houston, Texas.

MID-STATES AND SUPPLY CO.
Tulsa, Oklahoma
P. O. Box 2534 Phone CHerry 2-9128

FOR SALE EQUIPMENT

WORK OVER RIG Bucyrus Erie 36-L. Diesel Engine, 86' Telescoping mast, Rotary take off with friction clutch. Tandem wheels, 4' Substructure. James Drilling Co. Tulsa, TE 6-4795.

FOR SALE—30,000 ft. New 4½" OD-15.5# PE Tubing. 150,000 ft. 10¾" OD-41.85# No. 1 Grade Used Line Pipe, PE or T&C. Lundquist Pipe & Supply Co. 325 Wright Bldg. Tulsa 3, Oklahoma. Phone LU 5-8850.

COMPLETE, SLIM-HOLE, portable, double-drum Franks drilling rig, with 5,500 ft. of 3½-in. drill pipe. Priced to sell. FOB; Sterling, Colorado. For details call: LA 2-3696 or write Box 325, Sterling, Colorado.

DRILLING MACHINE for sale: 90 Keystone, only drilled four-4,000' wells. Must move, $6,000, no tools. Buda Motor, 4500' drilling lines. Excellent condition. Harold Hardwick, Burnside, Ky., Box 305.

TURBO EXHAUSTERS for sale—(1) Ingersoll-Rand Turbo Exhauster, 15,360 CFM @ 4.8 Psi. discharge pressure, driven by 454 HP. Moore Steam Turbine, 125 lbs. Steam 6,100 RPM with Ingersoll-Rand 2-Stage Barometeric Condenser. (1) Ingersoll-Rand Turbo Exhauster, 17,000 CFM @ 4.15 Psi. discharge pressure, driven by 678 HP. G.E. Steam Turbine, 125 lbs. Steam 4,600 RPM with Ingersoll-Rand 2-Stage Barometric Condenser. Excellent condition, attractively priced. Brill Equipment Co. 2401 Third Ave., New York 51, N. Y.

GAS COMPRESSORS: Clark RA-4, 400 HP; Clark RA-32, 300 HP; Clark RA-2, 200 HP; Ingersoll-Rand XVG-8, 300 HP. Alfred B. Kern, 305 Kennedy Building, Tulsa, Oklahoma.

36" x 70' OVERALL LEBLOND COMBINATION OIL FIELD TURNING THREADING, BORING & TREPANNING LATHE (CAN BE USED AS A 25' CC LATHE).

Built 1941. Used in gov. arsenal only. Excel. condition. 16" hole in spindle, 36" chuck, 6" boring bar, 25' max. cap. Two carriages with tapers. 40-30-7½-5 HP motors. Replacement value $150,000. Terms. 90 day return guarantee.

Very reasonable with or without Boring Equipment.

EVEREADY SUPPLY CO
Phone Collect—
ED 4-9471 Bridgeport, Conn. Box 638

LIQUIDATION

OF AMOCO REFINERY, DESTREHAN, LA.

- 19,000 BBL. CAT CRACKER (1953)
- 2,000 BBL. ALKYLATION (1953)
- 5—B&W BOILERS, 70,000 #/hr. 500 PSI. (1952)
- 50—80,000 & 55,000 BBL. TANKS
- 90—TOWERS & VESSELS, 2' to 12' dia. and 30' to 110' high
- 80—HEAT EXCHANGERS, 78 to 6,100 sq. ft.
- 3,170 CFM I-R 2-STAGE COMPRESSOR. Type HHE-2. 125 PSI. 600 HP Syn. Motor
- 5—FURNACES 1,300 to 2,200 sq. ft. Heating Surface
- 150 CENTRIFUGAL, HOT OIL and STEAM PUMPS
- 2—CARRIER CENTRIFUGAL COMPRESSORS, 38,300 CFM and 9,370 CFM with 3,370 HP and 2,310 HP TURBINES
- 500 INSTRUMENTS; RECORDING, CONTROLLING, ETC.
- 2—AMCO CAN SEALERS, 1 qt. and 5 qt.

PIPE in Carload or Truckload Lots from 1" to 16".
TANK PLATE in Carload or Truckload Lots ¼" to ¾".

DESCRIPTIVE BOOKLET WITH FULL SPECIFICATIONS AVAILABLE
WRITE • WIRE • PHONE TODAY

BE BRILL ESTABLISHED 1926 EQUIPMENT COMPANY

2401 THIRD AVE., N. Y. 51, N. Y. — CYPRESS 2-5703
4101 SAN JACINTO, HOUSTON, TEXAS — JACKSON 6-1351

Liquidation Site Office—Destrehan, La.—Telephone Norco 6571

FOR SALE EQUIPMENT

Immediate Deliveries on

PIPE

A few lots selected from hundreds in Foster's nationwide warehouses. Call us for all your regular requirements now.

PRIME TESTED SEAMLESS

22,000' 6⅝" OD x .280 18.97# DRL, BE
5,321' 7⅝" OD x .250 A53 B DRL, PEB
30,000' 16" OD x .250-.312 & .375 A53 B & API 5L-X (Seamless and Electricweld)
2,500' 20" OD x .312 & .375 API 5L & A53

PRIME TESTED ELECTRICWELD

10,000' 4" IPS Sch. 40 A53 B
24,000' 5⅝" OD x .258 GR. B, SRL, T & C
6,100' 6" IPS x .188 API 5L
6,730' 6" IPS Sch. 40 A53 B, DRL, PEB
12,000' 10¾" OD x .279
86,000' 12¾" OD x .281 API 5L-X42, DRL, BE
8,500' 20" OD x .250 A252 GR. 2, 40' lengths
2,400' 24" OD x .500 A252
2,700' 26" OD x .281-.312 & .406 API 5L-X42 & X52
22,000' 30" OD x .312-.375 & .625 DRL, PE
5,163' 36" OD x .406 API 5L-X52

STRUCTURAL STEEL PIPE

The following material offered at typical Foster Savings. Many more items available.

47,000' 12¾" OD x .203-.219-.250 & .330
7,100' 16" OD x .250
14,700' 24" OD x .281-.312-.375 & .438

STRUCTURAL Electricweld

Multiple carload lots of these items

7" OD x .272-.317-.362 & .408
8⅝" OD x .352
9⅝" OD x .316-.352 & .400

LIMITED SERVICE PIPE

40,000' 8⅝" OD x .172-.188 & .250
70,000' 16" OD x .312 (Made to API 5L-X52)
7,600' 24" OD x .312-.344-.375 & .474
11,000' 26" OD x .281-.312 & .406

PHONE FOR LATEST STOCK LIST PO

Including Seamless Carbon Pressure Pipe, Alloy, Stainless and Valves & Fittings.

L.B. FOSTER CO.

PITTSBURGH 30, PA. WAlnut 2-3232
NEW YORK 7, N.Y. BArclay 7-2107
CHICAGO 4, ILL. CEntral 6-6757
HOUSTON 2, TEXAS CApitol 7-4301
LOS ANGELES 5, CALIF. DUnkirk 3-3156
ATLANTA 8, GA. TRinity 5-7511

All material must be offered subject to prior sale

1956 MAYHEW 2000 drilling rig, 58 foot mast on International 190 Tandem. Complete with doghouse and accessories. $25,000. Reply P. O. Box 1049, Tulsa.

WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

EQUIPMENT WANTED

WILL BUY Chromatograph or small portable unit with Chromatograph depth recorder. Reply air mail Aparta Do Aereo, 6074 Bogota, Colombia.

SLIGHTLY USED 127' or 133' jack knife derrick complete with superstructure. Give details and price. Wise Operating Company, Box 297, Tyler, Texas.

HELP WANTED

WANTED: Refinery Process Engineer with three to five years experience in general refinery operations. Our plant is being expanded, and additional personnel are necessary. Furnish references, complete details of education and experience. Also, plant employment record and salary received. All replies considered confidential. Reply to Box No. L-477, The Oil and Gas Journal, Tulsa, Oklahoma.

HELP WANTED

PETROLEUM REFINING or Chemical Engineer, preferably with processing and refinery economics experience for computer section assignment in Tulsa. Describe qualifications and state salary desired. Personnel Department, Skelly Oil Company, P. O. Box 1650, Tulsa 2, Oklahoma.

ASPHALT PLANT superintendent or engineer with experience and good references for new plant in desirable Caribbean area. Box L-469, The Oil and Gas Journal, Tulsa, Oklahoma.

MODERN REFINING and Petro-Chemical plant has need of qualified personnel in Safety, Employee Relations and Insurance Departments. Submit complete resume of experience, recent photograph and salary expected in first letter. Reply to Box L-453, The Oil and Gas Journal Tulsa, Oklahoma.

Gasoline Plant Superintendent

We have an excellent immediate opportunity for experienced gasoline plant superintendent and operators for new gasoline plant under construction on Texas Gulf Coast. Reply is confidential. Send Resume and salary required to: room 1534, Tennessee Building, Houston 2, Texas.

CHEMICAL, PETROLEUM OR POWER ENGINEERS

The Foxboro Company is adding to its group of staff sales engineers to keep pace with its steadily increasing share of the industrial instrumentation industry market. Men needed should be graduate engineers with several years of instrumentation or process control experience in the chemical, petroleum, gas or power industries. You must be sales minded and should enjoy working with our customers and sales personnel. If you feel qualified for one of these challenging career opportunities send a letter and resume to:

Engineering Recruitment Office

FOXBORO

The Foxboro Company, Foxboro, Mass.

HELP WANTED

MEMO: To a Young Refining Engineer

This may be the job you want. Do you like to gather, organize, and interpret facts, and then to outline your conclusions on paper? To exchange ideas with others in the oil-processing business? To explain and pass along useful information?

Would you like to keep in touch with refining in particular and the oil business in general—to see the broad picture?

If so, this may be just the job you're looking for. **The Oil and Gas Journal** has an opening for a young editor interested in personal growth and job satisfaction.

- **Education-Experience:** Degree in chemical, mechanical, or petroleum-refining engineering, experience in refining operations.
- **Job Requirements:** Able to write clearly and logically, with a background of successful report writing, article writing, or other evidence of ability and performance. Personal drive. Self starter.
- **Job Satisfactions:** Salary comparable to that in the refining field. Insurance, retirement, and hospitalization benefits. Growth possibilities. Chance to broaden contacts and industry perspective. Pleasant associations. Creative surroundings.
- **Location:** Houston, Texas, with 10 to 20% time spent in out-of-town travel.

If you meet these qualifications and if these career possibilities are of genuine interest to you, write, giving all pertinent information, to Gerald L. Farrar, Engineering Editor, The Oil and Gas Journal, P. O. Box 1260, Tulsa, Oklahoma.

HELP WANTED

DRILLING OPERATIONS manager—An aggressive Independent Oil Company has an opening for a man capable of taking charge of and operating the drilling operations of company. He must be highly qualified with a thorough knowledge of all deep drilling problems and must have the ability to supervise and coordinate successfully all drilling operations. Prefer a man between 35 and 45 years of age with outstanding character and performance references—state in reply complete history and salary expected. Box L-468, The Oil and Gas Journal, Tulsa, Oklahoma.

WANTED: Refinery Engineer, under 42, with five to ten years experience in maintenance and construction in refinery having catalytic cracking, alkylation, catalytic reforming and asphalt facilities, to be maintenance engineer in 20,000 barrel refinery located in southwest. Send detailed resumé of experience with salary requirements to Box L-451, The Oil and Gas Journal, Tulsa, Oklahoma.

NEW OIL JOB Directory, foreign and domestic, showing where to apply for jobs. 500 selected producing, refining, butane and pipeline companies. Nationwide. $7.50 cash. OJML Co., Box 2603, Tulsa, Okla.

ASSISTANT COMPTROLLER
for
Large Independent Caribbean Island Refinery

To manage Refinery Accounting Department. Degree and heavy Refinery Accounting and Supervisory Experience Preferred.

Send resume of experience, education, personal history and salary to:

BOX L-459

THE OIL AND GAS JOURNAL,

TULSA, OKLAHOMA

AVAILABLE SALES POSITIONS

We have available several choice territories in U. S. and Canada to call on production superintendents, drilling companies, gasoline plants, refineries and pipeline contractors. Fast growing company. Well accepted product line, liberal commission, protected territory.
In reply state other lines handled.

Mid-States Chemical Co., Inc.
P. O. Box 525, Mt. Vernon, Ill.
Telephone 4310

PRODUCTION ENGINEERS
CONTINENTAL OIL COMPANY
We have openings in district offices of our domestic producing operations. Minimum of three years production experience plus BS degree required. Experience in reservoir engineering, waterflooding, down-hole corrosion, gas operations, or general field operations is acceptable. Response should include salary expected and complete resume of education and experience. Reply to Chief Engineer, Production Department.

Continental Oil Company,
P. O. Box 2197, Houston, Texas.

HELP WANTED

SALES MANAGER Excellent opportunity for capable man age 42 to 55 preferred, for firm manufacturing and jobbing equipment for oil and gas companies in Middle West, Rocky Mountain Area and Canada. Must be willing to move and travel half time or more. Salary open. Technical education or equivalent experience necessary. State age, education, past experience and marital status. References will not be contacted until after personal interview. Send recent photograph. Reply to Box L-466 Oil and Gas Journal, Tulsa.

TRANSLATORS. Proven ability to translate technical material into fluent English essential. Attractive full time or free-lance arrangement. All languages of interest, particularly Russian. Send resume to: A•T•S, Inc., Drawer 271, East Orange, N. J.

SITUATION WANTED

PETROLEUM ENGINEER, ten years, production, drilling, workover, reservoir experience mainly Venezuela, desires change. Prefer Argentina or Mexico. Box L-455, The Oil and Gas Journal, Tulsa, Oklahoma.

ACCOUNTANT—Presently Controller for large Texas steel fabrication plant. Position eliminated by parent corporation merger. Heavy industrial experience. Two years oil production. Standard cost and systems installation. Box L-433, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—GEOPHYSICIST, 28, single, 4 years major experience subsurface, surface, geophysical interpretations Venezuela, New York City, West Africa. Highly traveled, Spanish spoken, knowledge French, some German. Prefer subsurface or geophysical interpretations. Will consider any exploration position, domestic or foreign; available immediately. Resume on request. Write: Carl Metzger, 8655 South Throop, Chicago 20, Illinois.

EXECUTIVE, 18 years experience oil production lending. Desire position with responsible independent as Exploration Manager. Location immaterial. Rocky Mt. region preferred. Box L-461, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—33, over 5 years experience in Gulf Coast Region and Appalachian Plateau (including Geophysical Interpretation) desires position with aggressive company. Write: 703 Shenley Drive, Erie, Pennsylvania.

MECHANICAL ENGINEER, Extensive Experience in Natural Gasoline Plant Supervision, Design, Construction, Operation and Maintenance, with Major Company, desires change for more challenging opportunity. Box L-475, The Oil and Gas Journal, Tulsa, Oklahoma.

REFINERY ENGINEER—age 33. Ten years experience. Majority in economic evaluation, some in process design and technical service. B.S.—chemical engineering. Prefer southwest location. Box L-471, The Oil and Gas Journal, Tulsa, Oklahoma.

EIGHT YEARS experience as partner in small drilling contracting-oil producing company. Two degrees in business administration. Commercial instrument pilot. Age 33. Desire position to utilize experience. Box L-472, The Oil and Gas Journal, Tulsa, Okla.

PETROLEUM ENGINEER—Twelve years field, technical, management experience in Texas, Louisiana, Mississippi, Arkansas, Kansas, Oklahoma. Extensive Water Flooding—development, operation of old and new floods. Also primary drilling, completions, workovers, production, reservoir, evaluation, unitization, purchasing, administration. Desire responsible, diversified position with aggressive Independent or Consultant. Box L-473, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN, experienced in all phases of exploration and capable of handling any land matters from acquisition thru negotiation and contracts seeks situation where ability, ingenuity and drive are a must. Box L-474, The Oil and Gas Journal, Tulsa, Oklahoma.

CAPABLE GASOLINE and Carbon Black Mfg., available at once. Box L-479, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST—32, nine years sub-surface, stratigraphic, geophysical experience Texas-Louisiana Gulf Coast. Prefer Gulf Coast or foreign connection. Box L-478, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATION WANTED

GEOPHYSICIST: 21 years experience in in interpretation and supervision in the United States. Concentrated experience in the Gulf Coast Region. Desire position in geophysics with Houston base. Box L-463, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST, B.S., Age 23, Married. One summer surface mapping and well sitting. Two years schooling petroleum engineering. Three summers surveying. Finished active military obligation. Box L-476, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

ROYALTIES PRODUCING and non-producing oil leases in active territory. R. E. Clement, Box 65, Norman, Oklahoma.

LEASE AND DRILLING BLOCKS

WANT TO DRILL the N½ of the NW¼ of Sec. 16 T.13N R.12E Okmulgee, County, Okla. containing 80 Acres, Virgin Bartlesville Sand 1410 ft. Need a partner to help with the drilling and completing. Write Oil & Gas Journal P. O. Box L-460, Tulsa, Okla.

KENTUCKY—40,000 acres in Clinton, Wayne, Pulaski, Russell and McCreary Counties in blocks of 80 to 6,000 acres. Acreage adjoining, and near production. For information write P. O. Box 478, Burnside, Kentucky.

KENTUCKY OIL BOOM
Prompt details to any company, individual or group financially able to drill and wholly own 600' oil well on choice of 40 separate oil and gas leases ranging from 25 to 500 acres out of 6,000 contiguous acres containing 16 shut-in shallower gas wells in Metcalfe County, Kentucky. Phone EXpress 3387 or write Omar Cheer, 301 Civic Center Building, New Orleans 12, Louisiana.

WANTED—Small oil company, independent or association interested in finding oil in the
PARADOX BASIN
San Juan & Black Mesa Basins, 4-Corners area. **GEOLOGIST, 35, M.S., 6 yrs. surface, development and interpretive subsurface exploration and evaluation Texas and Southern Rockies. Resourceful and competent all phases petroleum exploration. Capable of initiating and directing small integrated exploration program. Desire work with group cognizant of the dignity and value of inteligent and practical geologic exploration. Good references. Resume, call or visit immediately on request. Box L-462, The Oil and Gas Journal, Tulsa, Oklahoma.**

BANKRUPT'S

OIL & GAS LEASES

FOR SALE

Sealed bids will be received until 2 P.M. October 5, 1959 for various working interests of C.M. & W. Drilling Co. Bankrupt, in 12 producing oil and gas leases in Wyoming, and 2 leases in New Mexico. Complete description of leases and full details will be furnished on request by:

Warren J. Taylor,

Trustee in Bankruptcy,

307 W. 19th St.

Cheyenne, Wyoming

LEASE AND DRILLING BLOCKS

OVERTON COUNTY, Tennessee 900 acres oil leases $2.50 per acre and 1/8 override or will sell outright. Ralph Mathias, Eldorado, Illinois.

I WILL DRILL your shallow prospect or buy your producing interest. U. S. Andersen, 8350 Santa Monica Blvd., Los Angeles 46, Calif.

FOURTEEN DIFFERENT leases: Containing approximately 3500 acres: Located in Baca, Bent, Kiowa, Prowers and Lincoln counties, Colorado. Almost entire area leased for oil and gas to major companies. Prefer sell all in one package: But will divide, or sell undivided interest or interests. Write for particulars to: W. J. Clay, 2005 W. T. Waggoner Building, Fort Worth, Texas.

TWO GAS FARMOUTS, for separate leasing. Sacramento Valley, Calif., and Red Desert, Wyoming. Each: approx. 9,000 acres; near production and market areas; geology; undivided half interest for zone test. Box 31 R 221, The Oil and Gas Journal, 4041 Marlton Ave., Los Angeles 8, Calif.

WE HAVE SEVERAL drilling deals in Southern Michigan ready for farmouts or cash consideration. Write: Box L-480, The Oil and Gas Journal, Tulsa, Oklahoma.

HAVE UNDER lease in Cumberland County Kentucky, over 2,000 acres. Close to production and is in area where some of the biggest oil wells were found. Also have over 2,000 acres in Pickett County, Tenn. This has all been geology tested and found good. Contact Ditch & Hanna Company, 132 So. Grant Street, Phone Howard (HO) 20826, Wooster, Ohio.

Drilling and Production Deals Wanted

Interested in acquiring complete or partial interest in drilling, producing farmout properties. Canada included particularly Saskatchewan.

SYNDICATE OIL CORPORATION
409 Beacon Building
Tulsa, Oklahoma.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware

AIRCRAFT

Pressurized and Refrigerated

MARTIN 404 FOR EXECUTIVE CONVERSION

Airplane stressed for turbo props. Low time 2800-CB-16/17 engines. Airplane low time since base overhaul. Ground and flight refrigeration. Short field T.O. and Ldg. capabilities. Quietest twin engine aflight! Boost controls. Complete airline radio. Integral loading ramp. Dual windows. Total gas load: 1,370 gals. Gross wt.: 44,900#. Empty: 27,790#. Trades accepted.

CALIFORNIA
AIRMOTIVE SALES CORP.
Gen. Offices: 7139 Vineland Ave.
No. Hollywood, Calif., TRiangle 7-1564
Airport facilities: Hangar 2,
Lockheed Air Terminal, Burbank, Calif.

TO CHANGE YOUR ADDRESS

IT'S BEST . . .
to send your old address clipped from the Journal mailing wrapper along with your new location.

ADVANCE NOTICE . . .
10 days before you move, and we guarantee you week-to-week undelayed service.

WRITE . . .
Circulation Department
THE OIL AND GAS JOURNAL
Box 1260 Tulsa 1, Okla.

PRODUCTION WANTED

WANTED: 250,000 barrels and up, or equivalent gas, fair price, cash, with or without development drilling and/or drilling deals. Box L-441, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION FOR SALE

GREEN COUNTY, Kentucky—Controlling interest available at $3,000.00 per 1/8 on approx. 20 acre tract. Two producing wells. Shallow drilling approx. 500'. Geneva E. Keesee, 1152 Bardstown Road, Louisville 4, Kentucky.

BOOKS

NEW TEXAS TAX LAWS showing all requirements. $7.50. Also Texas Land Laws, with Oil Forms. $7.50. Southwest Publishing Company, 6815, Joyce Street, Austin, Texas.

BUSINESS OPPORTUNITIES

MANUFACTURER Representative with well established business in Mississippi, Northeast Louisiana and Alabama is looking for additional lines. Sales office and warehouse in Jackson, Mississippi. If interested, Box L-456, The Oil and Gas Journal, Tulsa, Oklahoma.

FINANCIAL CONTACTS, Underwriters, Private Brokers reached. No shopping. Confidential. Send details to Consultant, 817, 51st Street, Brooklyn, N. Y.

NEW PRODUCTS WANTED—Well-established, responsible company with complete facilities for developing, manufacturing and marketing oil field equipment is seeking new or improved products, preferably patented or patentable to add to its presently well-known line. Royalty basis or outright purchase. Initial submission should identify product and general use without revealing engineering and confidential detail. Submissions will be handled promptly and confidentially. Box K-994, The Oil and Gas Journal, Tulsa, Oklahoma.

GOING BUSINESS WANTED
Midwest fabricators, jobbers and distributors of pipe, sheets, plates, tubing, fittings and tubular goods desire to acquire one or more corporations in related line of business for purpose of expansion. Would consider company in unfavorable current earning position or in need of financial assistance. Replies treated confidentially. Box L-439, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR RENT

DRILLING TOOLS FOR RENT:

Drawworks, rotary tables, traveling blocks, swivel and hooks, kelly, mud pits, mud pumps, blowout preventor, mud mixing pumps, Drill Pipe and Drill Collars and other drilling equipment.

Drilling Equipment for Sale

Call: **CENTRAL TOOL & SUPPLY COMPANY**

MAin 4-6651, Liberal, Kansas
CEntral 2-6318, Oklahoma City

REAL ESTATE

MERCANTILE DALLAS BUILDING

14th Floor—Approx. 3800 Sq. Ft.
Desirable Sub-Lease—Attractive Rate

H. E. Canada
1404 Mercantile Dallas Bldg.
RIverside 7-7011 Dallas

ADVERTISERS . . . in this issue

Air-Maze Corporation 117
Aluminum Co. of America 3

Baash-Ross Division of Joy Manufacturing Company 39
Babcock & Wilcox Company—Tubular Products Division, The 18
Baker Oil Tools, Inc. 22
Barold Division, National Lead Co. 9
Barret, Inc., William M. 125
Bethlehem Steel Company—Supply Division 12
Blackwood Co., J. A. 117
British Petroleum Company Limited, The 54

Canadian Industries, Limited 93
Chicago Bridge & Iron Company 5
Chicago Pneumatic Tool Company ..... Inside Front Cover
Classified Advertising .. 139, 140, 141, 142
Colorado Fuel and Iron Corp. 128
Columbus Hotel, The 117
Continental-Emsco Company, a Division of the Youngstown, Sheet and Tube Company ..... 71, through 76

Detroit Diesel Engine Division, General Motors 6
Dowell 20, 21
Drilling Equipment Manufacturing Co. 107

Goodyear Tire & Rubber Company, The 7

Halliburton Oil Well Cementing Co. 11, 35
Harbison-Fischer Mfg. Co. 104
Homco 100
Huey & Co., S. E. 93
Hughes Tool Co. ..... 52, 53, Back Cover

International Nickel Company, Inc., The 24

Jensen Bros. Mfg. Co., Inc. 16

Kidde & Company, Inc., Walter 14

Lane-Wells Company .. Inside Back Cover
Larkin Packer Company, Inc. 42

Mid-Continent Supply Company 4
Mission Mfg. Company 1
Moore Corporation, Lee C. 108

National Tank Company 144
Nordstrom Valve Division, Rockwell Manufacturing Company 8

Odex Engineering Company 122
Oil Well Supply Division 2

Pennant, Inc. 51
Process Operators, Inc. 93

Reed Roller Bit Company 126, 127
Rolo Manufacturing Company 12

Schlumberger Well Surveying Corp. .. 17
Southwestern Graphite Co. 121
Sunshine Iron Works 117

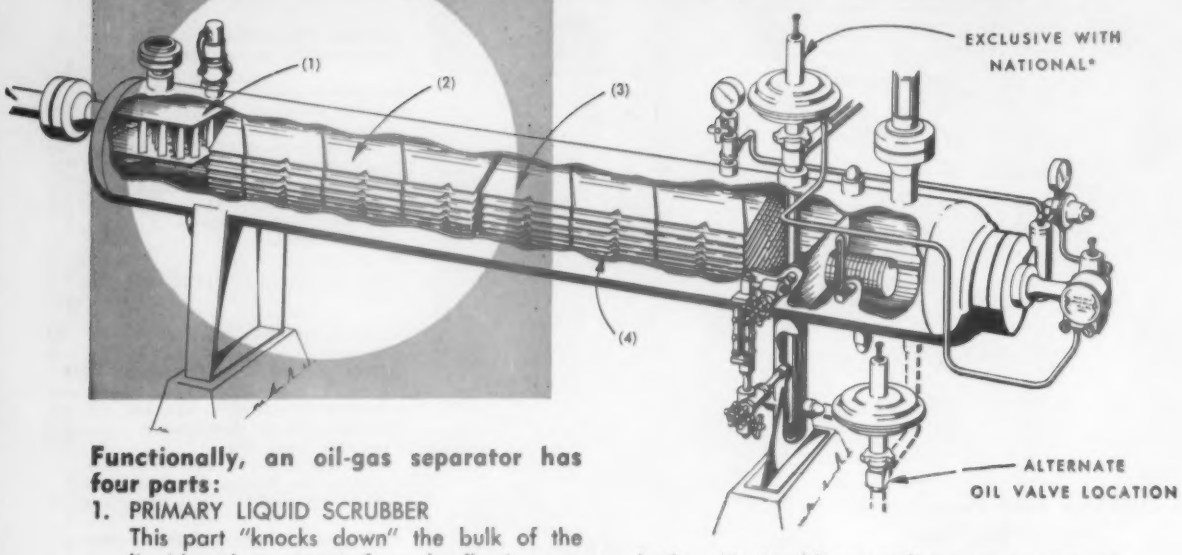
Thornhill-Craver Co. 96, 97

United States Steel Corporation—Oil Well Supply Division 2

Visco Products Co., Inc. 15

Well Equipment Mfg. Corp. 13
Western Company, The 106
Wichtex Machinery Company, Inc. 120

NATIONAL® MONOTUBE®
SEPARATORS



Functionally, an oil-gas separator has four parts:

1. PRIMARY LIQUID SCRUBBER
   This part "knocks down" the bulk of the liquid and removes it from the flowing gas stream immediately.
   National's present design is the result of field tests using full scale operational models which utilized numerous scrubbing elements. From these tests National's present design was found. Today, when you buy a National MONOTUBE Separator, you buy experience, not experimentation.
2. MAIN GAS SCRUBBER
   Also as a result of these tests, proper spacing and length of Main Gas Scrubber plates was discovered, so as to effect the greatest liquid removal from the gas stream.
3. FINAL GAS SCRUBBING
   The multiple field tests with flanged components dictated our design. National's "straight-vane" design accomplishes final liquid removal without the use of "excelsior-like" elements which are prone to be plugged with waxes, sands and other extraneous materials, including hydrates inherent in the normal oil-gas and distillate production operations.
4. OIL DE-GASSING COMPARTMENT
   What effects oil de-gassing? (a) Length of time in compartment. (b) Surface area of oil body. (c) Scrubbing surfaces to remove entrained gases. When (a), (b) and (c) are at a maximum, oil de-gassing is best. National's full-scale field testing found the proper ratios.

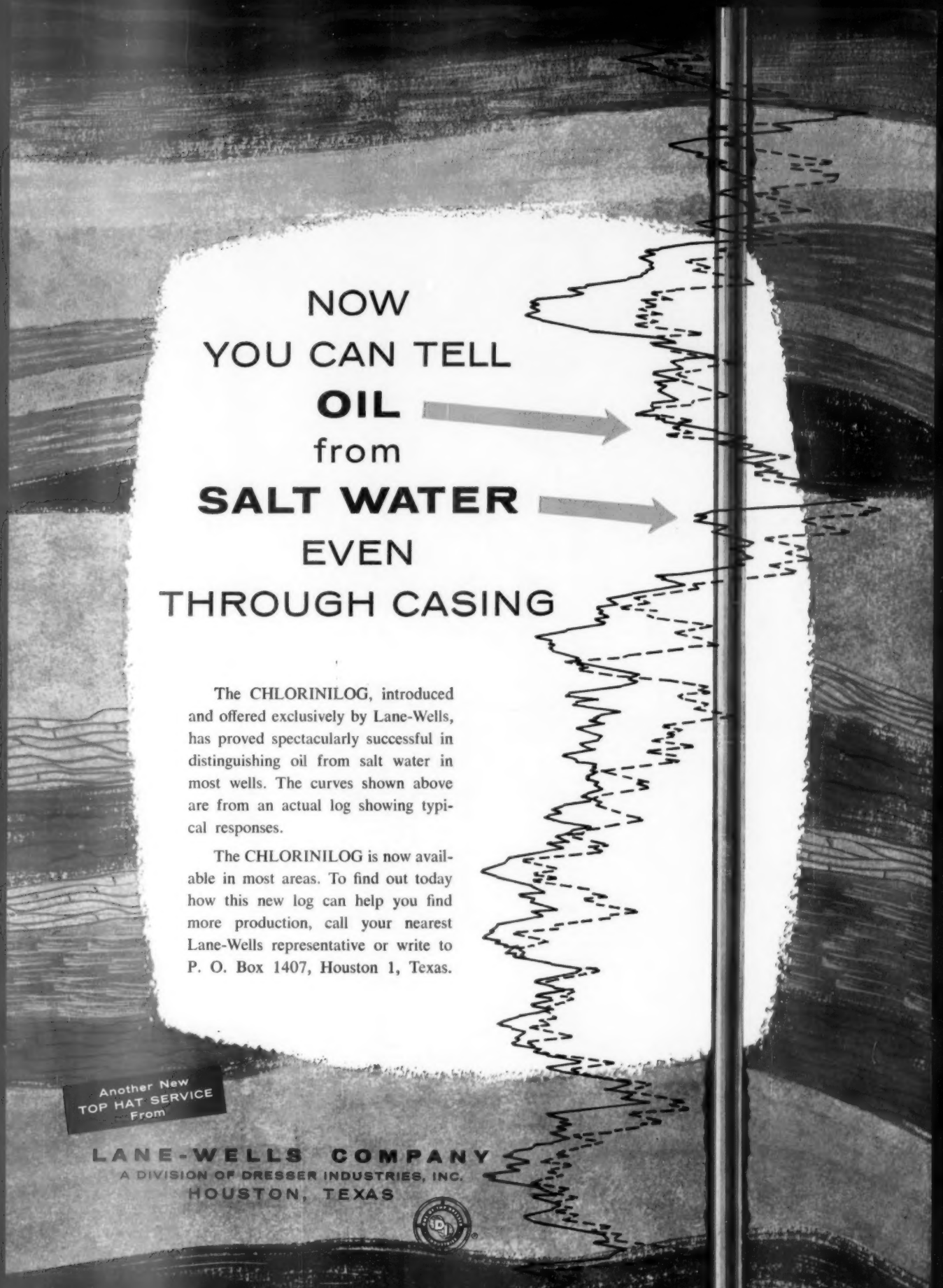
***EXCLUSIVE WITH NATIONAL!**

A field-proven, non-freeze liquid valve, particularly useful on high gas-oil ratio wells where entrance temperatures are near hydrate point. Ask your National man about this exclusive feature.

It's a National®

NATIONAL TANK COMPANY

TULSA, OKLAHOMA


NOW
YOU CAN TELL
OIL
from
SALT WATER
EVEN
THROUGH CASING
The CHLORINILOG, introduced and offered exclusively by Lane-Wells, has proved spectacularly successful in distinguishing oil from salt water in most wells. The curves shown above are from an actual log showing typical responses.
The CHLORINILOG is now available in most areas. To find out today how this new log can help you find more production, call your nearest Lane-Wells representative or write to P. O. Box 1407, Houston 1, Texas.
Another New
TOP HAT SERVICE
From
LANE-WELLS COMPANY
A DIVISION OF DRESSER INDUSTRIES, INC.
HOUSTON, TEXAS

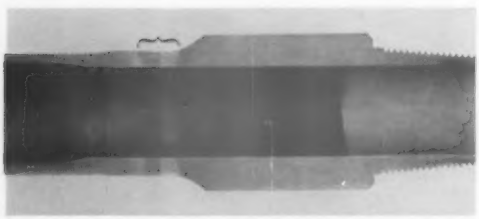
Magic Ring

makes Hughes Flash-Weld twice as strong!

A new process, developed by Hughes for heat treating "Flash-Weld" tool joint-to-pipe connections, has resulted in a major advance in drillstem construction. In this process an induction coil is used to normalize and stress-relieve the weld area—more than doubling the tension-impact strength of the connection.

Special electrical equipment, built to Hughes' own exacting specifications, performs this operation. After each joint is flash-welded to the pipe, the weld is automatically positioned inside the "magic ring." Induction heating to closely controlled temperature converts the metallographic structure within the weld affected area — ⅜" to ¾" on each side of weld—to a fine-grained, ductile, strong condition. After cooling, the weld is positioned in a second coil and heated to correct temperature for stress-relieving.

The result — proved in over 200 full scale tension impact tests — is a tool joint-to-pipe connection with metallographic uniformity across the weld that had not heretofore been available to the industry.



This cross-section of a finished "Flash-Weld" tool joint shows the very small area—only about ¼" on either side of the weld — that is affected by the new Hughes induction heat treating process. No other part of the pipe or joint reaches a temperature high enough to alter its metallurgical properties.

50TH ANNIVERSARY YEAR
1909 – 1959

FLASH-WELD
A DEVELOPMENT
OF
HUGHES
TOOL COMPANY
HOUSTON, TEXAS